"Determinants of sickness absence and early retirement intentions and the relationship between sickness absence and the risk of disability retirement or early retirement intentions in the Abu Dhabi Police"

Institution name: Institute of Epidemiology and Health Care

Candidate Name: Faisal Almurbahani Alkaabi

Degree: PhD in Epidemiology and Public Health/ Occupational Health and Safety

Declaration

I, Faisal Almurbahani Alkaabi, confirm that all the material presented in this thesis titled 'Determinants of sickness absence and early retirement intentions and the relationship between sickness absence and the risk of disability retirement or early retirement intentions in the Abu Dhabi Police' is my own work. I also confirm that the material presented in this thesis, in whole or in part, has not been written for me by other people. Where the information has been obtained from other sources, I confirm that this has been indicated in the thesis.

Acknowledgement

Firstly, I would like to thank the Ministry of Interior of the United Arab Emirates, particularly the Abu Dhabi Police, not only for sponsoring me to do the PhD but also for allowing me to use register-based data as well as surveying police employees as part of my PhD thesis.

My sincere thanks goes to Lt. General HH Sheikh Saif bin Zayed Al Nahyan, UAE Deputy Prime Minister and Minister of Interior for his continuous commitment to follow the vision of UAE Government in investing in UAE nationals by providing them with opportunities to study abroad and drive change locally by implementing internationally recommended evidence-based practices which in my case aim to improve the health and safety standards of the police force.

I would like also to express my sincere gratitude and appreciation to my 'role model', His Excellency Dr. Mohammed Saeed Al Badi, UAE's previous Minister of Interior, who taught me the importance of believing in one's self, aiming high, being determined and work hard persistently.

My special thanks to my PhD supervisors, Professor Jenny Head, Dr. Jenny Mindell and Mr. Martin Shipley who supported and motivated me throughout the PhD process. Their patience, guidance and encouragement have enhanced my enthusiasm and commitment to the research and made it all possible. Besides my University Supervisors, my additional gratitude to my university colleagues, particularly Sultan Almalki, Luz Sanchez, Esraa Aldalooj and Jing Liao for their precious support and stimulating discussions which allow me sustain my hard work and meet PhD deadlines.

My sincere thanks also goes to my best friends Hamad Alkaabi, Yasser Alkatheeri, Hassan Salim and Wael Abbas who did not hesitate to provide me with any help in the UAE and pushed me to ‘walk the extra mile’ and allowed me to focus and perform more effectively on my PhD goals.

Last but not least, my special thanks to my amazing family, my mother, my wife, kids, brothers and sisters for all their care, support and sacrifices they made throughout my studies in the UK. Your prayers and spiritual support were integral part of my PhD success and I could not have imagined having a better private life support.

Abstract

Aims: To evaluate the influence of psychological and physical exposures, as well as employees' perception of occupational health and safety management system, on the risk of sickness absence and early retirement intentions. The thesis also evaluates the relationship between sickness absence and early retirement intentions and disability retirement.

Methods: Two systematic literature reviews were conducted; one of studies on sickness absence in the police and the second evaluated all studies examining sickness absence and disability retirement. A case control study investigated the association between sickness absence and disability retirement using data from the Abu Dhabi Police. In a second study, the first Arabic version of the Karasek's Job Content Questionnaire (the Arabic JCQ) was developed and a linguistic and psychometrical validation was carried out. A cross-sectional survey of 1,317 employees of the Abu Dhabi Police was conducted in a third study.

Results: In the case control study, sickness absence, defined using various measures, was a predictor of disability retirement. Psychometric testing of the Arabic JCQ was generally comparable with other studies. The cross-sectional survey was completed by 760 officers (58% response rate). Work factors in general were not associated with sickness absence while officers with low workplace support, unfavourable perception of the health and safety management systems and high exposure to physical work factors had higher risk of early retirement intentions. There was a significant increase in the risk of early retirement intention in officers with ≥4 days of sickness absence compared with those without any sickness absence.

Conclusion: Monitoring sickness absence data may help in minimizing disability retirement and early retirement in general (through reducing early retirement intentions). The policing culture may discourage officers from taking sick leave and reporting problems at work which in turn, may result in shifting the consequences of work problems to private life and may encourage presenteeism.

Table of Contents

List of tables

List of tables (continued)

List of tables (continued)

List of tables (continued)

List of tables (continued)

List of figures

List of text boxes

Appendices

Appendices (continued)

Appendices (continued)

Appendices (continued)

Appendices (continued)

Appendices (continued)

Chapter 1: Introduction

According to the United Nations' World Population Prospects estimations of 2014, by 2050 the percentage of people in Europe older than 60 years of age is projected to be 37% of the total population; in America, it will be 27%, in China 41% and in UAE, 23% (one of the highest proportion of people of this age in the Middle East) (United Nations, 2015). This reflects the anticipated changes in demographics, mainly longer life expectancy and the decline in fertility rates (Van Dalen & Hankins, 2002). These changes will necessitate the reshaping of retirement and pension policies as well as other occupational health and safety standards to meet the needs of older workers and to encourage them to work longer (Marine & Prinz, 2003).

In the UK, over the working population of 29 million, it is estimated that 131 million days were lost in 2013 due to sickness absence, which represents 4.4 days lost per worker per year (Office for National Statistics, 2015). In the same year, there were 2,621 disability retirement cases in the UK, representing 4% of all new retirees (n=60,668) (Department for Communities and Local Government, 2014).

This thesis adds further insights into the existing few available studies on the relationship between work factors (psychosocial and physical work factors) and the risk of sickness absence and early retirement intentions in the police force. This research is the first to evaluate the association between employees' perceptions of health and safety management systems and the risk of sickness absence and early retirement intentions.

Previous studies examined the relationship between sickness absence and disability retirement using one or two sickness absence measures and few studies included adjustments for demographic factors or other sickness absence measures. This thesis evaluates this relationship using three sickness absence measures (the number of days of sickness absence,

the number of spells of sickness absence and the average length of sickness absence spells) adjusted for possible confounding factors and the other sickness absence measures. This research is also one of few to investigate the relationship between sickness absence and early retirement intentions and is the first to evaluate the relationship using a non-binary subjective sickness absence measure (Likert scale reflecting ranges of sickness absence durations). This research is also the first to develop and validate the Arabic Karasek's Job Content Questionnaire (JCQ). The questionnaire was validated linguistically and psychometrically using a sample from the Abu Dhabi Police.

The remaining sections of this introductory chapter describe sickness absence and the retirement process, discuss the importance of monitoring sickness absence and retirement, provide brief information about Abu Dhabi Emirate and its police, summarize literature findings with respect to predictors of sickness absence and early retirement intentions and describe the general structure of this thesis.

1.1 Sickness absence and the retirement process

The monitoring of sickness absence and retirement records is considered a crucial element of organisational reactive health and safety control systems. It is one of the major indicators of organisational continuous commitment for improving the quality of working conditions (Health and Safety Executive, 1997).

The term 'sickness absence' refers to any absence from work that is attributed to sickness by the employee and accepted as such by the employer (Whitaker, 2001), while retirement is traditionally defined as "the exit from an organisational position or career path of considerable duration, taken by individuals after middle age, and taken with the intention of reduced psychological commitment to work thereafter" (Feldman, 1994, p. 287).

At an individual level, sickness absence is a method of communicating illnesses and is influenced by work and non-work factors. It is associated with morbidity including disability (leading to disability retirement), mortality (Kivimaki et al., 2004; Vahtera et al., 2003), isolation and inactivity (Ockander & Timpka; 2001; Judiesch & Lyness, 1999), social problems (Duijts et al., 2006) and exclusion from the labour market (Henderson et al., 2005).

From an occupational health perspective, sickness absence could be considered as an indicator of job characteristics such as complexity of tasks, work environment, exposures to substances, ergonomics and other factors (Edwards and Scullion, 1982). Thus, sickness absence may provide evidence of the quality of health and safety management systems provided by the organisation (Health and Safety Executive, 1997).

Many models have been developed and applied to predict the complex process of retirement (Hwalek et al., 1982; Morrow, 1982; Beehr, 1986; Huhtaniemi, 1995; Harkonmaki et al., 2006), of which Beehr's model (1986) is the mostly widely accepted in the literature (Harkonmaki et al., 2006; Harkonmaki et al., 2009; Bonsdorff et al., 2010). This model describes three phases of retirement, starting with a preference for early retirement followed by the intentions to take early retirement and ending with adjustment to the new life after permanent withdrawal from the labour market. Each of these phases is influenced by different sets of determinant. The intention to retire and the actual retirement event may extend over several years. The retirement process in generally influenced by the interaction between the expectations, intentions, opportunities and constraints related to retirement (Beehr, 1986; Harkonmaki et al., 2006; Wang & Shultz 2010).

Various terms have been used in the literature to describe early retirement due to illness, including 'ill-health retirement' (IHR), 'disability pension (DP)', 'disability retirement', 'medical retirement', 'early retirement due to health or disability', 'medical unfit retirement'

and ‘invalidity pension’. Each of these terms has been used to describe an exit from work that is due/attributed to a medical condition or illness which limits an employee in performing routine work tasks. This variation in terms may be explained by the close link between disability benefits and old age pension systems and the fact that workers who are eligible for IHR or DP are subsequently shifted to the pension schemes covering old age as a whole. The variation could also relate to the different contexts and social security systems in different countries

1.2 Importance of monitoring sickness absence and retirement

The monitoring and reporting of data on sickness absence and retirement are essential, for several reasons. First, the data collected can be used to provide indirect measurements of the effectiveness of risk control systems and workplace exposure. Monitoring such occupational data is considered both an active and a reactive monitoring system (HSE, 1997). Monitoring of occupational health data may also provide more insights into the mediating mechanisms and casual processes of the relationship between work characteristics and employees’ health. This in turn, will facilitate a better design of the health and safety systems at the work place (Griffiths, 2000).

Monitoring methods may also help to reduce sickness absence and early retirement, which in turn will minimise financial loss. The costs entailed may act at an organisational or governmental level. The former occurs through the loss of productivity; organisations may struggle to replace competent and knowledgeable staff for longer periods, while costs increases at governmental level owing to increasing demands on government pensions and health care systems (Tanner, 1998; de Wind et al., 2013).

Furthermore, in a report submitted to the World Health Organisation, the research led by Leka et al. (2003) from the University of Nottingham concluded that monitoring employees’

health is crucial as employees suffering from occupational stress, for example, tend to be less motivated, adopt unhealthy and unsafe behaviours and be less productive which may reduce organisational profits and performance and thus, threaten the organisation's existence in the market.

1.3 Abu Dhabi Emirate and its police

Abu Dhabi is the capital of the United Arab Emirates (UAE) and represents 87% of its total area. Abu Dhabi sits on top of 10% of the world's oil reserves and 5% of global natural gas reserves (Statistics Centre of Abu Dhabi 2013A). The Abu Dhabi government was successful in reducing economic dependency on oil as in 2014, 49% of its Gross Domestic Product (GDP) (466,962 million out of 952,676 million AED[1]) were from non-oil economic activities. Abu Dhabi citizens enjoy one of the highest standards of living worldwide as the per capita GDP increased from 221,000 AED (£37,500) in 2004 to 369,000 AED (£62,500) in 2014 (Statistics Centre of Abu Dhabi 2015).

The total population of Abu Dhabi in 2014 was 2.6 million, of whom approximately only one-fifth were UAE nationals (0.5 million). More than two-thirds (1.7 million) of the population were male and 0.9 million were female. The majority of the population (82%) were between 15 and 64 years of age, reflecting the expatriate immigration for work purposes in Abu Dhabi. In 2014, the number of physicians, nurses and hospital beds per 1,000 population were 2.8, 5.8 and 1.6 in the UAE (Statistics Centre of Abu Dhabi 2015) compared with 2.8, 9.5 and 3.0 in the UK (World Bank, 2013). Life expectancy at birth is 79.2 years and differs little between males and females and citizens and non-citizens. The distribution of the work force by gender in Abu Dhabi in 2008 is shown in Table 1.1

[1] AED: Arab Emirates Dirhams; £1 sterling = 5.9AED

Table 1.1 Distribution of workforce in Abu Dhabi by gender

Employment factor	UAE nationals		Total	Non-nationals		Total
	Males	Females		Males	Females	
Labour force[1]	75,870	20,449	96,319	697,480	125,500	822,980
Working population	68,074	18,198	86,272	685,558	119,587	803,145
Unemployment rate (%)	8.1	29.6	12.6	1.8	6.4	3.6

Data obtained from Statistics Centre of Abu Dhabi (2013B)

1 This includes people who are working and those who are looking for jobs.

Abu Dhabi Police is a part of the Ministry of Interior of the UAE and consist of six General Directorates. Each General Directorate consists of several Administrations, which are further divided into departments, branches and units (see Figure 4.1). The General Directorate of Policing Operations is the largest employee recruiter and the only one that has Directorates rather than Administrations within its organisational structure. Although official statistics are unpublished, Abu Dhabi Police employs over 35,000 police officers and civilians. Reports comparing demographic or socioeconomic factors between Abu Dhabi Police and other government agencies are not available.

Various social and economic factors associated with the UAE have shaped the research methods of this PhD thesis. Despite not being affected by the political turmoil as other countries in the Middle East, the UAE government has increased its security standards in response to the Arab Spring, terrorist activities in neighboring countries and the increase in terrorist threats in general. Thus, conducting research in the police force using a study design such as the cohort design which necessitates access to all employee data would be difficult.

On the other hand, the UAE government have not only focused on cost cutting and increased effectiveness of human resources to improve revenues but also on promoting excellence, innovation and reaching out for service users. The UAE is one of few countries to appoint a Minister of Happiness and a Minister of Tolerance. This is crucial considering the fact that expatriates form the majority of the work force and resident population of the UAE.

Therefore, evaluation of sickness absence, disability retirement and early retirement intentions in the Police force, one of UAE's largest employee recruiters, would provide the government with insights into specific policing occupational health and safety requirements. Meeting these specific standards will enhance the productivity of officers which in turn, will maximize security and stability in the country.

The police in the UAE primarily constitutes of UAE nationals while non-nationals mainly work as civilians. The police occupation is also considered as one of the prestigious jobs in the UAE and officers are continuously encouraged to stay close to the public to gain more insights into their concerns to enhance public safety.

The Ministry of Interior in the UAE was also successful in recruiting talents by sponsoring students to study abroad a wide range of subjects and allowing them to transfer their scientific knowledge and 'know how' to the policing practices. The rewarding system of UAE's Ministry of Interior is designed effectively to promote and reward officers for outstanding performance. This resulted in attracting large number of UAE nationals to the policing occupation in recent years. Police top management in the UAE emphasize that the health and safety of the workforce is an integral part to the success of policing operations.

1.4 General predictors of sickness absence and early retirement intentions

This section provides a summary of the general predictors of sickness absence and early retirement intentions. (Note: As for disability retirement, this research only evaluates the use of sickness absence data in the prediction of disability retirement (Chapter Four) and does not examine the influence of work factors on the risk of disability retirement. A summary of the influence of work and non-work predictors of disability retirement are provided in Appendix Table A 1.1).

1.4.1 Sickness absence

There are two broad sets of determinants of sickness absence, namely, non-work related factors and work related factors.

a) Non-work related factors

These factors include age, gender, family factors, socioeconomic status (SES), lifestyle factors, health related factors and other factors. Literature generally shows that risk of sickness absence increases in females (North et al., 1996; Kivimaki et al., 1997), unmarried, divorced, separated and widows/widowers (Bratberg et al., 2002; Niedhammer, 1998), individuals with low socio-economic status (SES) (Niedhammer et al., 1998; Vahtera et al., 2001). The research findings on the association between age and sickness absence are mixed (Ahola et al., 2008; Virtanen Taimela et al., 2007).

The risk of sickness absence also increases in current and former smokers (Lundborg, 2007; Niedhammer et al., 1998; Ala-Mursula et al., 2002), heavy, frequent and non-alcohol drinkers (the latter also known as 'abstainers') (Marmot et al., 1993; Upmark et al., 1999), problem drinkers (Upmark et al., 1999), obese individuals (van Duijvenbode et al., 2009) and physically inactive people (Vahtera et al., 1997; Eriksen & Bruusgaard, 2002). Higher risk of

sickness absence is also seen in individuals with the following; poor self-rated health (Marmot, 1994; Kristensen et al., 2010), health complaints (Vaananen et al., 2003; Virtanen et al., 2007; Ahola et al., 2008) and low work ability (Bockerman & Ilmakunnas, 2008).

b) Work factors

The influence of work factors on sickness absence is evaluated below using the three broad sub classifications of these factors described by Laaksonen et al. (2010B) and Lahelma et al. (2012), namely, psychosocial working conditions (psychosocial exposure), physical working conditions (or physical exposure) and work arrangements.

Psychosocial factors

The greater part of the literature investigating the influence of psychosocial work factors on sickness absence is based on the job-demand-control model of Karasek (1979). The influence of high demand on sickness absence are mixed (Kivimaki et al., 1997; North et al., 1996) while high job control is shown to reduce sickness absence (Kivimaki et al., 1997; Niedhammer et al., 1998). Low control (Ganster & Schaubroeck, 1991; Karasek & Theorell, 1990) and high job demand (Schaubroeck et al., 1994; Melamed et al., 1995) have been linked to psychological stress and many illnesses that are associated with the increased risk of sickness absence (North et al., 1993; Houtman et al., 1994). The combination of the two dimensions (high demand and low control) also known as 'job strain' has a stronger effect on health outcomes such as sickness absence than the total effect of the two dimensions considered separately (Karasek, 1979; Karasek & Theorell, 1990).

In general, higher support minimises sickness absences (North et al., 1993; Vahtera et al., 1996, 2000) while a few studies have found association in only males (North et al., 1996) or females (Voss et al., 2001) or even a non-significant association (Kivimaki et al., 1997 &

2000). Social support has a buffering influence on stress, protecting workers from the pathological consequences of stressful experiences.

Physical characteristics

The literature review conducted by Allebeck and Mastekaasa (2004) on predictors of sickness absence indicated that evidence on the influence of physical work characteristics on sickness absence are 'limited', with a poor physical work ergonomic being the strongest of all physical factors as a predictor of sickness absences. Adverse working conditions reduce job satisfaction (Bockerman & Ilmakunnas, 2008) and cause job stress (de Croon et al., 2003) which in turn, is associated with many illnesses that increase sickness absenteeism (Johnson et al., 1996; Virtanen et al., 2007).

Work arrangements

Shift work, particularly evening shift (Merkus et al., 2012), increases sickness absence, because it increases fatigue (Jensen et al., 2003) and conflicts between work and family (Haines et al., 2008) and is linked to many illnesses (Van der Hulst, 2003). The risk of sickness absence may differ between various job types (Kivim.aki et al., 1997; Niedhammer et al., 1998). This relationship is influenced mainly by other factors such as job characteristics (Kristensen, 1991), socioeconomic status (Marmot et al., 1995), the available support and the representations of genders in different work areas (Alexanderson et al., 1994).

1.4.2 Early retirement intentions

This section examines the influence of work and non-work factors on early retirement intentions.

a) Non-work related factors

The risk of holding early retirement intentions increases in young employees (Siegrist et al., 2006; Bonsdorff et al., 2010), males (Nicolle et al., 2008; Elovainio et al., 2003), more frequent alcohol drinkers and smokers (Volanen et al., 2010), individuals in low SES categories (Elovainio et al., 2003; Harkonmaki et al., 2006) and those reporting poor self-rated health (Heponiemi et al., 2008; Bonsdorff et al., 2010), low work ability (Heponiemi et al., 2008) or medical symptoms (Siegrist et al., 2007).

b) Work factors

In general, the available literature provides limited evidence in terms of quantity with respect to the influence of work factors on early retirement intentions. Studies found mixed results regrading influence of job demand on early retirement intention (Siegrist et al., 2007; Sejbaek et al., 2013; Schreurs et al., 2011) while low job control generally increases early retirement intentions (Blekesaune & Solem, 2005; Elovainio et al., 2005). Low support at work also increases early retirement thoughts (Han et al., 2015; Elovainio et al., 2003 & 2005). Low job control is associated with many chronic health conditions (Macfarlane et al., 2009; Kivimaki et al, 2006) and may encourage individuals to adopt unhealthy lifestyle behaviours (Schneider & Becker, 2005; Parrott, 1999) which may in turn, increase the intention to take early retirement.

Finally, as for work arrangement, in general, manual workers have higher risk of holding early retirement intentions than those working in managerial positions (Harkonmaki et al., 2006; Wahrendorf et al., 2012). This could be attributed to the physical requirements of the job, the high job demands and low control associated with manual work (Kristensen, 1991) and the low social support available to these workers (Alexanderson et al., 1994).

1.5 Structure of the thesis

The research initially provides a discussion of two systematic reviews, one evaluating all studies on sickness absence and police while the other examines published literature on the relationship between sickness absence and disability retirement (Chapter Two). After identifying limitations of previous literature, the aims, objectives and research hypotheses are provided in Chapter Three.

This is followed by examining the use of sickness absence data in the prediction of disability retirement in the Abu Dhabi Police through a case-control study (Chapter Four). As this research also aims to primarily evaluate psychosocial work predictors of sickness absence and early retirement intention, Chapter Five discusses the procedures and results of the validation and the development of an Arabic version of Karasek's Job Content Questionnaire (Karasek, 1998; Hadi et al., 2006), the most commonly used self-administered measure to evaluate occupational psychosocial environment (Kompier, 2003; Hurrell et al, 1998).

An occupational health and safety survey of employees in the Abu Dhabi Capital Police Administration was conducted in 2015. The aim of the survey was to study the influence of work factors on the risk of sickness absence and early retirement intentions. The results of this cross-sectional study are discussed in Chapter Six. Finally, an overall discussion of this research along with strength, limitations and recommendations for future practice and research are provided in Chapter Seven.

Chapter 2: Systematic literature review

The general aim of this thesis is to evaluate determinants of sickness absence, disability retirement and early retirement intentions in the police and investigate the relationship between these outcomes. Evaluating rates and determinants of sickness absence in Abu Dhabi Police with other police forces thoroughly necessitates examining all available literature on sickness absence in the police force. In addition, investigating previous studies that aimed to evaluate the relationship between sickness absence and disability retirement assists in comparing the results of the current study (with respect to the latter relationship) and findings from other studies.

Therefore, this chapter describes the methods, results and limitations of two systematic literature reviews, one examining sickness absence in the police while the second evaluates the relationship between sickness absence and disability retirement.

2.1 Systematic literature review one: Studies investigating sickness absence in the police

Police work involves exposure to certain occupational hazards which might endanger the health of officers, such as handling law enforcement, exposure to violent situations, negative attitudes or even threats from the public and uncomfortable work schedules. Thus, and due to the complexity of their operational activities and working environment, the rate of sickness absences and occupational injuries in organisations such as the police, fire fighting and other emergency response services is higher than in other organisations (Houser et al., 2004; Arnott & Emerson, 2001; Summerfield et al., 2011).

This section describes the methods implemented to conduct a systematic literature review of the available studies seeking to evaluate sickness absence in the police. This is followed by a summary of these studies and a discussion of their findings and limitations.

2.1.1 Search strategy and results

The systematic literature search was conducted using six search engines: Medline, Embase, Scopus, Psych Info, WOS (Web of Science) and IBSS (International Bibliography of Social Science) between 15/01/2013 and 18/02/2013. The search was then updated between 02/01/2016 and 10/01/2016. The keyword search was carried out using the following keywords (the search was not restricted to any language or date):

• **Sickness absence**: sick* leave or absen*, medical* leave or absen*, ill* leave or absen*

• **Police:** Police, law enforce*, policing

The systematic search also included searching by subject of interest, which was possible only in Medline, Embase and Psych Info (see Table 2.1 below).

The results of the keyword and subject (when applicable) searches for each variable were added together, then combined with results from other variables and finally uploaded in the Reference Manager 12 program. The final numbers of resources found as a result of this process are shown in Table 2.2.

Table 2.1 Subject search strategy in Medline, Embase and Psych info databases.

Variable	Search engines		
	Medline	**Embase**	**Psych Info**
Sickness absence	Sick leave/or absenteeism/or sickness absence.mp	Sickness absence.mp. or absenteeism/	exp employee absenteeism/or sickness absence.mp
Police	Police/or police.mp.	Police.mp. or police/	exp law Enforcement/or exp police personnel/or police.mp.

Table 2.2 Total numbers of resources found and search engine used for the systematic review of all studies investigating sickness absence in the police

Variable	Search engines						
	Medline	**Embase**	**Scopus**	**Psych Info**	**WOS**	**IBSS**	**Total**
Sickness absence and Police	229	606	539	223	987	116	2,700

2.1.2 Filtration processes

A new reference manager file was created for all the resources obtained for each relationship. The resources were then filtered in four main stages. In the first stage, duplicates were removed, either automatically or manually. This was followed by the second and third stages (also known as the first and second sift of resources), in which irrelevant resources were removed through a visual examination of titles and another of abstracts. In the final stage, resources were filtered in accordance with sets of criteria for inclusion and exclusion. The number of resources remaining in the study after the first three filtration stages is demonstrated in Table 2.3.

2.1.3 Final search results

As it can be seen from Figure 2.1, 134 resources remained after the first sift (eyeballing titles) and 33 after the second sift (abstract sifting). As recommended by Greenhalgh and Peacock (2005) and adopting a similar strategy to that implemented by Körlin et al. (2009) on their systematic literature review of studies investigating sickness absence in the police, a hand search was conducted for all citations within each of the 33 final studies. This process yielded nine additional relevant articles that had not been detected by previous search strategies. Therefore, the final number of resources available for the next stage was 42.

All the resources were then viewed in accordance with sets of inclusion and exclusion criteria. Resources were excluded if the absence variable was related to general absence (not specifically sickness), if the study described sickness absence from the prospective of employees' rights or discussed policies for sickness absence in the police and when the studies combined sickness absence in the police with that in other occupations, such as rescue personnel.

The main inclusion criterion was that the studies should provide prospective or retrospective analyses of sickness absence in the police with the former variable being an outcome or an explanatory factor for a given outcome. Figure 2.1 demonstrates results after each stage of filtration for resources examining sickness absence in the police. It can be seen that out of 42 final relevant resources, only 32 were included in the study and the remaining resources were excluded for reasons described in Box 2.1.

Table 2.3 Results after the three stages of filtration for the systematic review of all studies investigating sickness absence in the police

Variables	Total before Filtration	Total after removal of duplicates	Total after first sift	Total after second sift
Sickness absence and Police	2,700	1,497	134	33

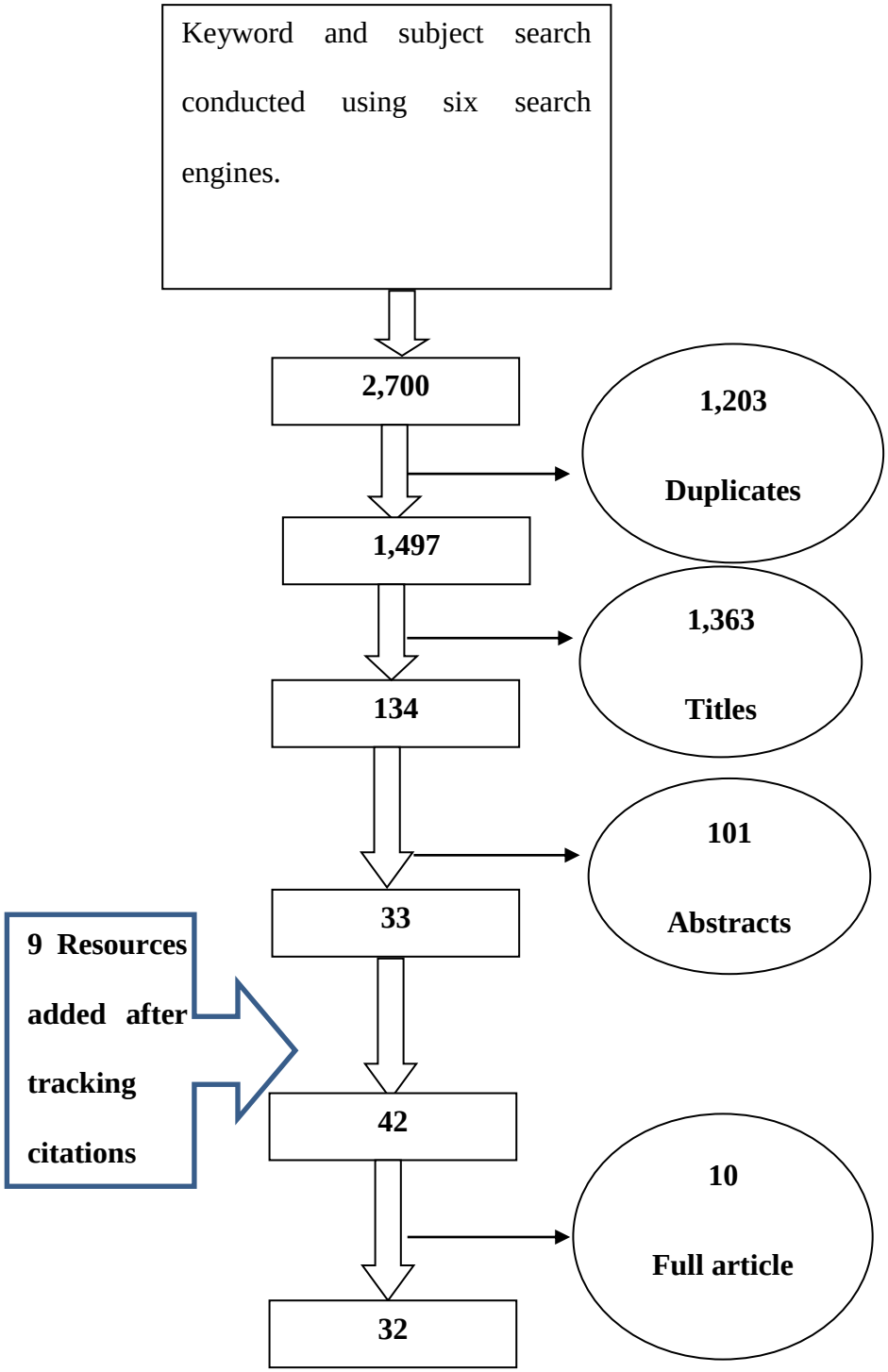

Figure 2.1 Stages of systematic search for resources that report sickness absence in the police

▭ Stages of systematic literature search ⬭ Number of irrelevant resources after each stage

Box 2.1: Reasons for excluding resources that examine sickness absence in the police.

a) Excluded because study describes general absence in the police and not sickness absence specifically (n=1) (Ovuga and Madrama., 2006).

b) Excluded because study combines sickness absence in the police with three other occupational categories involved in emergency response to disaster (n=1) (Morren et al., 2007)

c) Excluded because it discusses sickness absence in the military police (n=1) (Demerouti et al., 2004).

d) Study describes rights, compensations, sickness absence policies and general findings from the literature (n=6) (Emerson, 1951; (Unknown author, 1953); Gilber et al., 2006; Körlin et al., 2009; Guthrie, 2010; Summerfields, 2012).

e) Excluded because study is a conference abstract and further details of the study were published some years later (Svedberg et al., 2012) and included in the final 32 articles (n=1) (Svedberg et al., 2007)

2.1.4 Summary of studies

A summary of all 32 relevant studies and nine (out of 10) excluded studies is provided in Tables 2.4 and A 2.1 (Appendix) respectively. All the 32 relevant studies are evaluated regardless of their quality.

As shown in Table 2.4, there were four interventional studies (Phillips et al., 1991; Lechner & De Vries, 1997; Arokosi et al., 2002; Hunt et al., 2013), five studies with cohort design (Tang and Hammontree, 1992; Gardner et al., 1998; Dirkzwager et al., 2004; Rajarantham et al., 2011; Ferrario et al., 2007), three case control studies (Weil et al., 2004; Gye and Porter, 1998; English et al., 2013) and one study implementing mixed methods (Arnott and Emerson, 2001) while the remaining 19 studies adopted a cross-sectional study design. The sample size for these studies ranged from 60 (Lalic & Hromin, 2012) to 16,725 police officers (Svedberg & Alexanderson, 2012). More than half (19 out of 32) of the relevant studies were published between 2000 and 2015, one-third between 1990 and 1999 (10/32) and only three studies published between 1970 and 1989.

There were 12 (out of 32 relevant studies) conducted in the United States of America and almost two thirds in European countries (8 Scandinavian studies, 6 British, 2 Italian, 1 Croatian and 1 Kosovan). There were only two Asian studies, one from Hong Kong (McGhee et al., 2000) and the other from Israel (Weil et al., 2004).

Eight cross-sectional studies used register-based data (Cascio & Valenzi, 1978; Guest, 1982; Boyce et al., 1991; De Loes & Jansson., 2012; Boyce et al., 2006; Baraku et al., 2010; Fekedulegn et al., 2013A & 2013B) while the remaining cross-sectional studies, except for Steindhardt et al. (1991) and Magnavita and Garbarino, (2013) used both register-based data and survey data. Their response rate ranged from 51% in the Norwegian study of Berg et al. (2006) to 90% in the Hong Kong study of McGhee et al. (2000).

Among the five cohort studies, three of the studies examined research questions using survey data (Tang and Hammontree, 1992; Ferrario et al., 2007; Rajarantham et al., 2011), one used register-based data (Dirkzwager et al., 2004) while Gardner et al. (1998) evaluated survey responses on the effect of exposure on registered job performance outcomes (including sickness absence). In these studies, police officers were followed up for anything between 6 months (Tang and Hammontree, 1992) and six years (Gardner et al., 1998).

Data from an electronic or manual employee registry (register-based data) were utilized in two of the three case-control studies (English et al., 1989; Weil et al., 2004) with a case-control ratio of 1:1 (Gyi and Porter., 1998), 1:2 (Weil et al., 2004) and 2:1 (English et al., 1989). The cases in these studies were police officers exposed to acutely toxic chemicals on highways (English et al., 1989), officers driving many miles per job (Gyi and Porter, 1998) and those with a certain lumbar spine disorder (Weil et al., 2004).

Two out of the four interventional studies utilized survey data (Phillips et al., 1991; Arokosi et al., 2002) and interventions were a fitness/rehabilitation programme (Lehner & De Vries, 1997; Arokosi et al., 2002), trauma risk management program (Hunt et a;., 2013) and employees' preferred shift work (Phillips et al., 1991) with pre-intervention measurements taken at baseline (Arokosi et al., 2002), three weeks (Phillips et al., 1991) and one year (Lehner & De Vries, 1997) while post intervention measurements were taken at two months (Hunt et al., 2013), four months (Phillips et al., 1991), one year (Lehner & De Vries, 1997) and one year and a half (Arokosi et al., 2002).

Seven of the 32 relevant studies compared the sickness absence records of the police with those of other occupations. Three of these seven studies compared police officers with similar disciplinary occupations, the Royal Air Force (Guest, 1982) and occupations involved in emergency response including ambulance staff, fire-fighters and municipality emergency

personnel (Dirkzwager et al., 2004; Gjerland et al., 2015). One study compared the sickness absence attitudes of manual shipyard workers with those of non-manual clerical workers in the police, post office and a telecommunication company (Lalic & Hromin, 2012). The three remaining studies compared the police with the banking and chemical industries (Lechner & De Vries, 1997), loggers, hairdressers and farmers (Arokosi et al., 2002) and teachers, register office workers and clerks (Ferrario et al., 2007).

As shown in Table 2.4, half of the 32 relevant studies used register-based sickness absences and the other half used subjective measure of sickness absence. In all studies, except for Goodman (1990), sickness absence was either a primary outcome or an outcome among other job performance or health outcomes. These studies, however, differed in the type of sickness absence measure used as shown in Box A 2.1 (Appendix). It is unclear which measure of sickness absence was used by Brown et al. (1995) and by Gardner et al. (1998) and thus, these studies are not included in this Box.

Table 2.4 summary of the 32 relevant studies evaluating sickness absence in the police by year of publication

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Cascio & Valenzi, 1978, USA	To evaluate the correlation between subjective measure of police performance (as rated by supervisor) and objective performance for minority and non-minority police officers.	Cross-sectional	952 police officers from a large USA police force.	Register-based data	Subjective evaluation of performance provided by supervisors.	Average length of sickness absence spells per year and other job performance measures.	There is a statistically significant correlation between supervisory rating of job performance and average length of sickness absence spells with/without adjusting for age and tenure
Guest, 1982, UK	To compare rates of SA between the male population of the Royal Air Force Waddington and the Lincolnshire Police Force during November 1980.	Cross sectional	1154 police and 1580 RAF personnel	Register-based data	Occupation (presence of occupational health services in RAF versus its absence one in the police)	Total days of SA lost, total number of SA spells, length of SA spells and SA prevalence	A statistically significant increase in risk of all sickness absence measures in the police compared with the RAF.
English et al. 1989, USA	To evaluate differences in SA (1-7 days) between highway patrol officers exposed to highly toxic chemical spills (cases) and those were not exposed to such spills (controls) in 1984.	Case control study	993 California highway patrol officers exposed (cases= 655) and controls (n= 338)	Register-based data.	Exposure to toxic spills and symptoms related to sickness absence (from medical records).	Mean hours of sickness absence.	Exposure to hazardous materials during a highway patrol spill did not significantly increase risk of hours of sickness absence on the day and after 7 days of exposure to acutely toxic substances.

Table 2.4 continued

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Goodman, 1990, USA	To determine the relationship between certain biographic, demographic and situational variables as they relate to burnout in a sample of police officers	Cross-sectional	199 police officers from a California based police department	Survey	Average length of sickness absence spells per year, average days of hospitalization during career and other variables.	Burnout	Average length of sickness absence spells per year and days of hospitalization predicted burnout (R square=0.10 and 0.26 respectively)
Boyce et al. 1991, USA	To determine the relationship between five physical fitness tests and sickness absence	Cross-sectional	514 police officers from a large USA police force	Register-based data	Physical fitness	Monthly rate of sickness absence	Physical fitness was a poor predictor of sickness absence and females had 2.4 days per year more of sickness absence than males.
Phillips et al. 1991, USA	To examine the effects of shift work on sleep quality and psychological function in Lexington Police Department	Interventional	63 patrol police officers (from the 163 initially surveyed officers)	Survey	Permanent shift work	Sleep Quality and monthly absentee rate	Approximately one third reduction in absentee rate after six months of implementing permanent shift work.
Steinhardt et al. 1991 USA	To determine if level of physical activity and cardiovascular fitness significantly associated with sickness absence.	Cross-sectional	734 police officers from Austin (in Texas) Police Department	Survey, register-based data and fitness test.	Cardiovascular fitness and level of physical activity	Average length of sickness absence spells per year.	Officers reporting sedentary life style (physical inactivity) had significantly high average length of sickness absence spells (12.46) after adjusting for age.

Table 2.4 continued

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Tang & Hommontree, 1992, USA	To evaluate the effect of hardiness, police stress and life stress on officers' illness and absenteeism	Cohort followed for 6 months	100 officers completed surveys in Time 1 and 60 on Time 2 (after six months). From seven suburban police departments.	Survey	Hardiness, police stress and life stress	Reported days of absence in the last six months and illnesses questionnaire.	Unlike life stress, police stresses have a statistically significant effect on absenteeism (R square=0.04). Interaction between hardiness and police stress on absenteeism also statistically significant (R square=0.09).
Kirkcaldy et al. 1994, UK	To evaluate relationship between work stress and job satisfaction for physical wellbeing (relevant aim for this review; do smokers have more sickness absences than non-smokers?).	Cross-sectional	517 senior police officers from Great Britain.	Survey	Smoking	Average length of sickness absence spells per year.	Lowest average length of sickness absence spells in non-smokers (Mean=2.4, S.D.8.3) followed by ex-smokers (3.4, 16.0) and smokers (4.9, 17.1). Mean difference did not reach statistical significance ($p>0.05$)
Brown et al. 1995, UK	To examine various components of detriment as defined in the Sexual Discrimination Act and adverse impacts of violation of such components	Cross-sectional	1,802 Police female officers, 510 male officers and 164 civilian female police employees. (Total n=2,476)	Survey	Detriment related to career progression, access to organisational benefits and exposure to sexual harassment.	Reported sickness absence and other work outcomes.	Women were more likely than males to take sickness absence due to career progression frustration (chi square=6.2, $p<0.01$) Other measures of detriment were not significant. Number or rate of sickness absence was not stated.

Table 2.4 continued

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Lechner and de Vries, 1997, Netherland	To examine the effect of participation in an employee fitness programme on reduction of absenteeism due to illness on three different worksites (police force, chemical industry, banking)	Interventional	884 from three worksites selected by stratified sampling of which 289 were police officers	Register-based data	Fitness programme, working site, age and sex,	Average length of sickness absence spells per year.	The high participation group had a significant decline in average SA days, police (n=58) = -3.7, Chemical factory (n=27) = -8.78 and Banking (n=30) = -3.2 days
Gardner et al. 1998, USA	To examine the relations between peer assessment and long-term law enforcement job performance.	Cohort (6 years follow up)	24 officers who completed training at a Police Academy in 1989.	Survey and register-based data	Peer ranking in 1989 with respect to interpersonal responsiveness, technical ability and overall likelihood of success as a police officer.	Job performance (including sickness absence) completed by supervisors in 1995.	The results indicate that peer rankings were associated with retention even 6 years' post-assessment. Peer assessment among law enforcement candidates was not significantly correlated with either subjective or objective measures of their job performance 6 years later.
Gyi and Porter, 1998, UK	To evaluate sickness absence due to musculoskeletal disorders (MSD) for police officers with various exposures to driving	Case-control	80 traffic police officers (cases) and 91 general duty police officers (controls) (total n=171)	Survey	Driving (miles/year)	Reported sickness absence and other health outcomes	Significantly higher number of sickness absence days due to MSD within last 12 months for those driving 25,000 miles (2.84 days) or over, compared with those driving 15,000 miles and under (0.67 days).

Table 2.4 continued

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
McGhee et al. 2000, Hong Kong	To examine impact of passive smoking at work on use of healthcare services and absenteeism.	Cross-sectional	4,819 police officers from various police departments in 1995.	Survey	Exposure to passive smoking at work and duration of suck exposure.	Reported previous six months sickness absence and other health outcomes.	Compared with those unexposed, only males who were exposed to passive smoking had a significant increase in risk of sickness absence in the fully adjusted model (OR=1.50). Increased exposure (> one-year median) resulted in further increase (OR=2.0)
Arnott and Emerson, 2001, UK	To evaluate sickness absence management in the police forces of England and Wales.	Mixed method	43 UK and Wales police forces	Surveys, telephone interviews and focus groups.	Police force.	Sickness absence and other performance variables.	Sickness absence levels for police officers vary substantially between forces ranging from 9.1 to 15.5 average days lost (1999-2000).
Arokoski et al. 2002, Finland	To evaluate the effectiveness of a rehabilitation programme on use of health-care services, work absenteeism and physical activity (18 months follow-up).	Interventional	265 patients from four occupational groups (loggers, hairdressers, police officers (n=64) and female farmers)	Survey and physical measure-ments.	Occupation	Reported absenteeism (last six months) and other health and lifestyle factors.	The number of sick-leave days significantly increased for the police officers after their rehabilitation (from 2 days in the last 6 months at the beginning to 5 after the programme)

Table 2.4 continued

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
De Loes and Jansson, 2002, Sweden	To examine injuries and subsequent sickness absence following mandatory fitness training in the Swedish Police Force.	Cross-sectional	920 injuries for police officers after mandatory fitness training	Register-based data	Fitness training	Injuries and subsequent sickness absence	Mean number of sickness absences due to mandatory fitness training was 23 and 16 for females and males respectively. 48 out of the 92 injuries in 1995 lasted more than 14 days and two thirds of them (32) resulted from team or contact sports.
Dirkzwager et al. 2004, Netherlands	To examine the longitudinal impact of disaster on rescue workers (police officers, fire-fighters, ambulance and municipality personnel) on health outcomes	Cohort followed up for two and a half years.	1,036 rescue workers in the Netherlands in an area involved in a disaster (785 police officers)	Register-based data	Involvement in disaster (event)	Sickness absence and other health outcomes	There was a statistically significant difference in average length of sickness absence pre and post disaster, from 6.6 six months pre-disaster to 11.6 and 9.8 sickness absence 1-6 months and 7-12 months post disaster respectively. No statistically significant differences in average sickness absence pre and post disaster found between the four occupational groups.
Weil et al. 2004, Israel	To examine clinical relevance of pre-employment results regarding lumbar spine Spondylolysis on sickness absenteeism in the Israeli Police Force	Case-Control study	160 cases with x-rays confirmed lumbar spine Spondylolysis and 338 without this condition (controls) (Total n=498)	Register-based data and medical records.	Lumbar spine Spondylosis	Sickness absence due to low back pain	Percentage of days lost due to low back pain in cases was 2.7 times higher than controls but did not reach statistical significance (p=0.12) Incidence density of absenteeism was 5.79 per 100 person-years in cases compared with 5.22 per 100 person-years in controls.

Table 2.4 continued

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Burk and Mikkelsen, 2005, Norway	To compare various job outcomes in a sample of male and female Norwegian police officers.	Cross-sectional	451 Norwegian police constables.	Survey	Gender of the officer.	Reported sickness absence in the last six months (yes/no and how many) and other work outcomes.	There is no statistically significant difference between males and females in number of sickness absence in the last 6 months (mean =6.2 SA days for both males and females).
Berg et al. 2006, Norway	To assess help seeking behaviour in the Norwegian police and how it relates to subjective health complaints.	Cross-sectional	3,272 Norwegian police officers	Survey	Visits to healthcare professionals	Sickness absence due to stress last year and other health outcomes.	Contacts to nearly all kind of health professionals significantly increased risk of sickness absence with highest increase in risk for those visiting psychologists/psychiatrics (OR=4.16) and general practitioners (OR=3.7) while lowest significant risk seen in those visiting occupational health practitioners (36% increase).
Boyce et al. 2006, USA	To compare various health measures between non-smokers and smokers in a sample of police officers	Cross-sectional	514 USA police officers.	Register-based data. (Did not state how smoking status was examined)	Smoking status.	Absenteeism monthly rate, workers' compensation, body mass index and physical fitness.	There were no significant differences in absenteeism rate between smokers and non-smokers even after adjusting for age and gender.

Table 2.4 continued

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Ferrario et al. 2007, Italy	To assess incidence of sickness absence in a sample of Italian female workers and identify non-work and work factors associated with sickness absence	Cohort followed up for two years	3,698 female employees (258 were police officers) and remaining work in kinder garden, register office and clerks.	Survey	Occupation	Incidence of short (2-7 days), medium (8-27 days) and long term (>27 days) sickness absence over two years (No details of how SA records collected)	A statistically significant difference in incidence of all types of sickness absence between the four occupations with female police having highest incidences of short and medium term sickness absence (33.8 and 33.6 per 100 years/person respectively). Compared with administrators, those working in the police had a significant 75% and 84% increase in risk of short and long term sickness absence
Baraku et al. 2010, Kosova	To explore sickness absence trends in the Kosova Police between 2005 and 2007.	Cross-sectional	6960 officers (79% of employees in total) who reported sick during between 2005–07.	Register-based data	Demographic factors.	Average % SA, SA duration, frequency and diagnosis.	Frequency of sickness absence increased from 0.85 in 2005 to 1.38 in 2007 and the duration of sickness absence reduced from 5.5 in 2005 to 3.51 in 2007. The results were in the form of a conference abstract.
Rajarantham et al. 2011, USA and Canada	To evaluate risk of major sleep disorders on health, safety and other job and health outcomes of police officers.	Cohort followed up for two and a half years.	4,957 police officers from USA (97%) and Canada (3%) participating in online survey (3,693) and onsite screening (1,264)	Survey	Sleep disorders	All causes of sickness absenteeism and other job performance and health outcomes.	Officers who met the criteria for positive sleep disorder had a statistically significant increase in risk of all causes of absenteeism (OR=1.23, 1.08-1.40) in the fully adjusted model.

Table 2.4 continued

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Lalic & Hromin, 2012, Croatia	To find the extent of presenteeism and absenteeism in manual workers and whether it differs in clerks who perform sedentary work	Cross-sectional	121 manual workers and 120 clerks working for post office, Telecommunication company and police administration (n=60).	Survey	Job type (Manual versus clerk)	Sickness presenteeism and sickness absenteeism.	Using Stanford Presenteeism Scale, Rijeka Presenteeism Scale and Rijeka Absenteeism Scale have shown no statistically significant differences among four groups of examinees. Rijeka Absenteeism has shown low reliability, Crombach's a=0.236, Standardized a=0.324, X=23.58.
Svedberg & Alexanderson, 2012, Sweden	To find if sick leave among employees in the Swedish Police was associated with experiences of discrimination, harassment and violence (or threats of violence).	Cross-sectional	Responses from 16,725 Swedish police officers and civilians (74% response rate of total Swedish police in 2005)	Survey	Demographics, discrimination from superiors, peers or public, sexual harassment, public harassment, ethnical discrimination and violence or threats of violence.	Reported SA in the last 12 months (yes/no)	Statistically significant increase in risk of SA due to all exposure variables except for harassment from public and threats of violence reported by females and sexual orientation reported by both genders. Highest significant increase in risk of SA in those reporting discrimination due to impaired functioning and (OR=7.8 and 8.79 for females and males respectively).
Magnavita and Garbarino, 2013, Italy	To test whether stress variables were predictors of absenteeism in an Italian Special Police Unit	Repeated Cross-Sectional	290 police officers	Survey and register-based data.	Occupational stress assessed using questions from the JCQ and the effort /reward imbalance model.	Total number of days of SA, Total number of SA spells and number of short term SA (less than 7 days) STSA in 2008 and 2009.	High reward had a protective effect on all measures of sickness absence in the fully adjusted model. The association between the other variables on the three sickness absence measures were mixed.

Table 2.4 continued

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Fekedulegn et al. 2013A, US	To evaluate the association between different shift work types and the risk of sickness absence.	Cross-sectional	Sickness absence data of 424 police officers of the 464 Buffalo Cardio-Metabolic Occupational Police Stress Study (BCOPS).	Register-based data	Shift work type (day, afternoon and night shifts)	Two binary outcome variables; occurrence Of any SA or any SA of 3 or more days.	Highest rate of sickness absence was seen in police officers working at night shift followed by afternoon and day shift (4.37, 1.96 and 1.55 per 10,000 person-hours respectively).
Fekedulegn et al. 2013B, US	To evaluate the association between paid working hours and incidence of sickness absence in a sample of police officers.	Cross-sectional	Data from 395 police officers out of the 464 Buffalo Cardio-Metabolic Occupational Police Stress Study (BCOPS).	Register-based data	Work hours per week.	Count of spells of one-day and 3 or more sickness absence days.	A one-hour increase in the total paid working hours significantly reduced both one-day SA (RR = 0.95, 95% CI= 0.92 – 0.98) and three days or more of SA (RR = 0.92, 95% CI=0.89 – 0.95).
Hunt et al. 2013, UK	To evaluate the influence of a risk management intervention program on the risk of sickness absence in a sample of police officers	interventional	717 police employees of Cumbrian Constabulary involved in a major manhunt during 2010 who received TRiM intervention.	Register-based data	Level of exposure to the incident, officer/civilian, rank and years of service.	Duration of sickness absence	Police officers with high (versus low) exposure to the major manhunt event had a significant increase in the risk of long term sickness absence (OR=2.41, 95% CI=1.43‑4.05)

Table 2.4 continued

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Gjerland et al. 2015, Norway	To examine the level of sickness absence and help seeking among rescue workers involved in a terror attacks occurred in Norway in 2011	Cross-sectional	1,790 rescue workers out of 2,922 involved in the terror attack who answered the survey 10 months post the incident (253 police officers)	Survey	Occupational group, length of service, working site in the attack and other exposures.	Duration of sickness absence and psychological support.	The rate of sickness absence varied from 2.4% in police officers to 14.5% in unaffiliated rescue volunteers.

2.1.5 Summary of findings

A) Socio-demographic characteristics of the police samples

As shown in Table A 2.2 (Appendix), the most common variables used to describe the police samples in the 32 relevant studies were age and gender (used by more than half of the relevant studies) followed by race, tenure, rank, education and marital status (used by 8 to 10 studies). The mean age of police samples ranged from 28.3 (Cascio & Valenzi, 1978) to 47.1 (Kirkcaldy et al., 1994).

In 16 out of the 18 studies (from the 32 relevant studies) that reported the gender characteristics of the sample, the percentage of male police officers was much higher than that of females, ranging from 62% (Svedberg & Alexanderson, 2012) to 97% (Kirkcaldy et al., 1994). In only two studies was a higher number of females compared with males: Brown et al. (1995) and Lalic & Hromin, (2012); females accounted for almost 80% and 55% respectively, of the entire sample in these studies. The high number of females in the former study was required because it was assessing the perceptions of female police officers about experiences of sexual work harassment, while the latter, Lalic & Hromin (2012), included clerical police officers in the sample, a type of police work which is typically performed by females.

Ten out of the 32 relevant studies reported characteristics by tenure or years working in the police, with means ranging from three (Cascio & Valenzi, 1978) to 26.7 (Kirkcaldy et al., 1994). As regards the distribution of police ranks, ten studies also reported characteristics using this variable and sample mainly included police officers in the lower ranks, ranging from 55% (Kirkaldy et al., 1994) to 84% of the sample (Weil et al., 2004). The race of police officers was reported mainly by eight US studies, with highest percentages being White

officers (ranging from 66% (Gardner et al., 1998) to 85% (Rajarantham et al., 2011)) followed by Black (ranging from 6% (Cascio & Valenzi, 1978) to 34% (Gardner et al., 1998)) and then other minority groups.

The authors of six out of the eight studies that reported the educational status of police officers defined this variable in terms of years of education, while the other two studies used qualifications as a measure of educational level (Magnavita & Garbarino, 2013; Kirkcaldy et al., 1994). The mean of years of education for police officers was similar in Tang and Hammontree, (1992) and Gardner et al. (1998) (13.2 and 13.7 respectively). One third of the the police samples of Fekdulegn et al. (2013A and 2013B) had four years or more of college education. However, the percentages of police officers within each subcategory of years of education varied widely between the Norwegian study of Burk and Mikkelsen, (2005) and Weil et al. (2004).

On the other hand, in the two studies that reported educational qualification, the percentage of officers with a diploma/degree in the sample of Magnavita & Garbarino, (2013) was 75% compared with 41% officers with similar qualifications in Kirkcaldy et al.'s sample (1994). In the latter study, 44% of officers had the qualifications of GCE up to O level (>12 years of education). Finally, regarding marital status, eight of the 32 relevant studies reported the distribution of this variable in the police. In general, the percentage of married officers ranged from 37% (Magnavita and Garbarino, 2013) to 85% (Burk & Mikkelsen, 2005).

B) Exposures

As shown in Tables 2.5 and 2.6, the 32 relevant studies investigated the influence of 10 non-work (Table 2.5) and 19 work related variables on sickness absence (Table 2.6).

Non-work variables and sickness absence in the police

Apart from gender (three studies), smoking and physical activity (two studies), the impact of non-work variables on sickness absence were included in only one study. Boyce et al. (1991) and Burk & Mikkelsen, (2005) showed no significant differences in sickness absence rates between male and female police officers but Svedberg & Alexanderson, (2012) reported a significant 29% increase in risk of sickness absence in female officers compared with male after adjusting for age, duration of employment, and type of employment.

As regards smoking, Kirkcaldy et al. (1994) and Boyce et al. (2006) showed no significant difference in sickness absence rates between smokers and non-smokers. Officers who adopt a sedentary life style had significantly higher days of sickness absence (12.6 days of sickness) than physically active officers (approximately 7.5 days of sickness). However, using register-based data, Boyce et al. (1991) found that the five fitness measures used significantly predicted sickness absence rates for officers who are 35 years of age or older and also reported no significant difference in rates of sickness absence between male and female police officers with various levels of fitness after adjusting for age.

Regarding age, Svedberg & Alexanderson, (2012) showed that, compared with police officers who are 30 years of age or younger and after adjusting for gender, all other groups had a statistically higher risk of sickness absence with the highest increase in those between 40 and 55 (OR=1.54 (1.26-1.88)) followed by officers between 31 and 39 years old (OR=1.47 (1.19-1.82) and officers who are 56 and above (OR=1.39, (1.12-1.73). When stratified by gender,

the risk remained statistically significant in females in all age groups (using the same reference group) and the risk increased up to 90% (40-55 years old), 80% (31-39 years old) and 56% (≥56 years old). In males, the risk remained statistically significant only in officers between 41 and 55 years of age (OR=1.39). Although some studies adjusted for age (Boyce et al., 1991; Magnavita & Garbarino, 2013; Rajarantham et al., 2011), they did not report age related differences in risk of sickness absence.

With regard to years of employment, compared with officers with five years or fewer of employment and after adjusting for gender, Svedberg & Alexanderson, (2012) showed that the risk of sickness absence increased significantly by 66% in those with six to nine years of police work and then declined to 24% and 20% respectively in officers with 10-25 years and 26 years and above of employment (but remained significantly higher than the reference group). As shown in Table 2.5, when stratified by gender, the risk increased in females and was only statistically significant in males with six to nine years of employment.

Previous sickness absence was a significant predictor for future sickness absence in the fully adjusted model (Magnavita & Garbarino, 2013). Visiting almost any healthcare professional was associated with an increase in the risk of sickness absence significantly after adjusting for marital status, rank, alcohol consumption and self-reported health. The highest increase, by 420% and 370% was after visiting psychologists/psychiatrists and general practitioners, respectively (Berg et al., 2006).

However, in the case control study of Weil et al. (2004), the health measure of the presence of x-rays confirming lumbar spine disorder did not result in a significant increase in the risk of sickness absence in the cases (those with the disorder) compared with the controls. This was the only exception. Finally, sleep disorders increased the risk of sickness absence by

23% after adjusting for sex, age, body mass index, primary police activity, shift rotation, second job, number of night shifts worked, mean total of working hours per week, and monthly sleep totals.

Table 2.5 Non-work variables and their effect on sickness absence in the 32 relevant studies.

Exposure group	Exposure	Statistical findings
Non-work	Gender	Compared with men, women had statistically higher sickness absence **(OR=1.29 (1.17-1.43))** (Svedberg & Alexandesron, 2012) (Adjusting for age groups, gender, duration of employment and type of employment)
		No significance differences in sickness absence rates between males and females with various levels of fitness **(F=0.68, p=0.60 and F=2.23, p=0.07 respectively)** (Boyce et al., 1991) (Adjusting for age, gender and physical fitness)
		No significant difference in occurrence/number of sickness absences between male and female police officers (Burk & Mikkelsen, 2005)
	Age group	*Age groups* *OR (95% CI)* ≤30 Reference group 31-39 **1.47 (1.19-1.82)** 40-55 **1.54 (1.26-1.88)** ≥56 **1.39 (1.12-1.73)** (Svedberg & Alexandesron, 2012) (adjusting for gender) *Age groups* *Females* *Males* OR (95% CI) OR (95% CI) ≤30 Reference group 31-39 **1.80 (1.28-2.54)** 1.34 (0.99-1.80) 40-55 **1.90 (1.37-2.64)** **1.39 (1.55-1.85)** ≥56 **1.56 (1.09-2.24)** 1.32 (0.97-1.78) (Svedberg & Alexandesron, 2012)

Table 2.5 continued

Exposure group	Exposure	Statistical findings
Non-work	Duration of employment	*Years police work* — *OR (95% CI)* ≤5 years — Reference group 5-9 — **1.66 (1.34-2.05)** 10-25 — **1.24 (1.07-1.43)** ≥26 — **1.20 (1.04-1.39)** (Svedberg & Alexandesron, 2012) (adjusting for gender) *Service years* — *Females* OR (95% CI) — *Males* OR (95% CI) ≤5 years — Reference group 5-9 — **1.74 (1.29-2.34)** — **1.59 (1.17-2.15)** 10-25 — **1.36 (1.09-1.68)** — 1.13 (0.93-1.38) ≥26 — **1.38 (1.11-1.72)** — 1.08 (0.90-1.31) (Svedberg & Alexandesron, 2012)
	Previous sickness absence	*Lost days 2009* — *SA Frequency 2009* — *STSA 2009* Lost days 2008 — **OR=5.74 (3.33-9.87)** SA Frequency 2008 — **OR=4.11 (2.43-6.95)** STSA 2008 — **OR=4.08 (2.53-7.39)** (Magnavita & Garbarino, 2013) (Adjusting for age, length of service, education level,marital status, presence of children, housing, and rank.)

Table 2.5 continued

Exposure group	Exposure	Statistical findings
Non-work	Lumbar spine disorder	Ratio of days lost due to back pain Cases= 0.19 +/- 1.3 Control= 0.07 +/- 0.26 **p=0.13 (N.S.)** Ratio of days lost due to general sickness absenteeism Cases= 1.75 +/- 6.39 Controls=1.86 +/- 4.22 **p=0.82 (N.S)** (Weil et al., 2004)
	Visits to healthcare professionals	Risk after visiting healthcare professionals (OR, 95%CI): GP=**3.70 (2.40-5.80)**, private specialist=**2.30 (1.70-3.10),** occupational health practitioner=**1.36 (1.00-1.80),** chiropractor =**1.40 (1.00-2.00),** physiotherapist=**2.50 (1.80-3.40),** homoeopathist=1.49 (0.80-2.80), psychologist/psychiatrist=**4.20 (1.70-8.60),** hospital physician (no admission) =**1.78 (1.30-2.50)**, hospital physician with admission= 1.48 (0.90-2.30), other physicians=**2.00 (1.20-3.50)** (Berg et al., 2006) (Adjusting for marital status, rank, alcohol consumption and self-reported health)
	Sleep disorders	Risk of sleep disorder on sickness absence: Unadjusted **OR=1.26 (1.12-1.42)** After adjusting for sex, age, body mass index, primary police activity, shift rotation, second job, number of night shifts worked, mean total work hours per week, and monthly sleep **OR= 1.23 (1.08-1.40)** (Rajarantham et al., 2011)

Table 2.5 continued

Exposure group	Exposure	Statistical findings
Non-work	Smoking status	No statistically significant differences in means of sickness absence between smokers, ex-smokers and non-smokers **(F (2,519) = 1.24, p > 0.05)** and a significant positive correlation between physical ill health and sickness absence in non-smokers and ex-smoker was found **(0.15 and 0.16 respectively)** (Kirkcaldy et al., 1994)
		Differences between smokers and non-smokers in absenteeism rate (days/year) Males Females **F= 3.5, p=0.06 F= 0.4, p=0.55** No statistically significant differences in absenteeism rate between smokers and non-smokers (Boyce et al., 2006) (Adjusting for age)
	Physical activity and fitness	Sedentary officers were absent significantly **(p< .05)** more (12.6 SA days) than officers who were occasionally active (7.58 SA days) or active three times per week (7.45 SA days). There was a significant group by sex interaction (the two (sex) by three (fitness category) ANOVA with absenteeism as the dependent variable) F=3.47 and p = 0.03, but no significant main effect for both sex F= 0.46; p = 0.49 and group F=0. 73; p = 0.48 (Steindhardt et al., 1991)
		All fitness measures did not significantly increase rate of sickness absence in officers 34 years and younger **(F=3.54, p=0.03)** but did for officers 35 years and older **(F=2.2, p=0.04).** No significance differences in sickness absence rates between males and females with various levels of fitness **(F=0.68, p=0.60 and F=2.23, p=0.07 respectively)** (Boyce et al., 1991) (Adjusting for age, gender and physical fitness)
	BMI	In overweight police officers (BMI ≥25 kg/m^2), those working in night shifts had significantly higher risk of sickness absence of ≥1 day (**IRR= 2.29, 95%CI= 1.69-3.10**) and ≥ 3 days (**IRR=1.65, 1.17-2.31**). This association was not seen in officers with normal BMI score (BMI< 25 kg/m^2) (Fekedulegn et al., 2013A).

Work related variables and sickness absence in the police

As shown in Table 2.6, out of the 19 explanatory work-related variables that were included in the 32 studies, the influence on sickness absence of only three variables was included in more than one study, namely, job sector (Dirkzwager et al., 2004; Arokosi et al., 2002; Ferrario et al., 2007), harassment (Svedberg & Alexandesron, 2012; Brown et al., 1995) and shift work (Phillips et al., 1991; Fekedulegn et al., 2013A). Dirkzwager et al. (2004) found no statistically significant difference in the average length of sickness absence spells between the police and other emergency personnel, while Arokosi et al. (2002) reported a significantly higher risk of sickness absence in the police than in hairdressers, loggers and female farmers. This higher risk in the police was also supported by Ferrario et al. (2007), who showed an increase in risk for the police by 75% for short term sickness absence (2-7 days) and 84% for long term (≥27 days) compared with administrators.

The findings with respect to the influence of harassment are mixed, Svedberg & Alexanderson, (2012) found a significant increase in the risk of sickness absence for male and female officers (OR=2.4 and 1.7 respectively) reporting sexual harassment at work while Brown et al. (1995) did not. The former study also showed an increase in the risk of sickness absence in male officers (OR=1.44 (1.26–1.65)) reporting harassment from the public but not in females (OR=1.01 (0.84–1.20)).

Svedberg and Alexanderson (2012) have also investigated the influence of five types of discrimination types (as shown in Table 2.6) and three types of violence on sickness absence for male and female police officers. Exposure to all these measures, apart from discrimination due to sexual orientation and threats or violence (in women only), resulted in a significant increase in the risk of sickness absence with the highest increase for discrimination due to

impaired function (OR=7.73 and 8.79 for women and men respectively) and violence leading to consultations with psychologists (OR=5.0 for both genders).

In addition, Svedberg & Alexanderson, (2012) found no significant difference in the risk of sickness absence between civilians and officers in the police force. However, when gender stratification was used, male civilians had a higher risk of sickness absence than male officers (OR=1.24 (1.04–1.49)) while for females being a civilian had a protective effect on sickness absence (OR=0.83 (0.71–0.97)). All of the results of Svedberg & Alexanderson, (2012) stated above were adjusted for age groups, duration of employment and type of employment.

Two explanatory variables, namely, shift work and physical fitness, were included as interventional methods of reducing sickness absence. On the one hand, preferred shift work for police officers resulted in a significant one third reduction of sickness absenteeism rate (Phillips et al., 1991) while the fitness programme of Arokosi et al. (2002), on the other hand, resulted in a significant increase in sickness absence days (5 sickness absence days in the previous 6 months) for police officers, compared with workers in other occupations.

Fekedulegn et al. (2013A) also investigated the influence of various shift types on the risk of sickness absence on a sample of US police officers. The research found a statistically significant increase in the incidence rate ratio in night shift workers versus day workers and afternoon workers for ≥1 days and ≥3 days of sickness absence.

In 1980, Lincolnshire Police Force, which had no occupational health department, had significantly higher sickness absence (using four different measures) than the Royal Air Force which had an occupational health department. There was no significant difference in sickness absence risks or attitudes between shipyard manual workers and non-manual clerical police officers (Lalic & Hromin, 2012). English et al. (1989) also found that police officers

who were exposed to acutely toxic materials (the cases) did not have a significantly higher risk of sickness absence than those who were not exposed (the controls) from day 1 to 7 days after their exposure.

Other instances of exposure which have been linked to an increasing risk of sickness absence in the police significantly include driving a car for long periods as part of the job (Gyi and Porter., 1998), police stress (Tang and Hammontree, 1992), career progression frustration (only in females), exposure to major manhunt (Hunt et al., 2013) and passive smoking (only in males). Please refer to Table 2.6 for more details.

Finally, only one study investigated the influence of the job demand, control and support model as well as the effort/reward imbalance model (Magnavita & Garbarino, 2013) on three sickness absence measures, namely, number of days of sickness absence, frequency of sickness absence and number of short term sickness absence spells. As shown in Table 2.6, in the fully adjusted model, high reward was the only variable with significant influence in all the measures of risk of sickness absence; high reward in 2008 significantly reduced the risk of having many lost days, high frequencies of spells of sickness absence and the number of short term sickness absences (STSA) in 2009. High job control had a similar statistically significant protective effect on the risk of STSA in 2009.

Table 2.6 Work variables and their effect on sickness absence in the 32 relevant studies.

Exposure group	Exposure	Statistical findings
Work related factors	Presence of occupational health services	Unlike the Royal Air Force, the police department has no occupational health department and showed a significantly higher risk of sickness absence using four measures: ➢ Number absent per day (% population ratio= **4.90,** standard error= **0.59)** ➢ Inception rate per day (% population ratio=**1.82,** standard error= **0.23**) ➢ Length of spell per absentee (% population ratio=**0.88,** standard error=**0.27)** ➢ Ratio of SA prevalence (rate as %= **0.92** standard error= 0.13). (Guest, 1982)
	Discrimination	*Type of discrimination* *Women* *Men* OR (95% CI) OR (95% CI) From supervisor or peers **2.95 (2.40-3.63)** **3.44 (2.84-4.17)** Ethnical **3.28 (1.24-8.69)** **2.96** (1.39-6.29) Due to impaired function **7.73 (4.50-13.27)** **8.79 (5.59-13.82)** Due to sexual orientation 1.83 (0.21-16.98) <0.001 (<0.001->999) Any type of discrimination **2.70 (2.23-3.28)** **3.52 (2.94-4.23)** (by superiors or peers) (Svedberg & Alexandesron, 2012) (Adjusting for age groups, gender, duration of employment and type of employment)
	Harassment	*Type of Harassment* *Women* *Men* OR (95% CI) OR (95% CI) Sexual harassment **1.70 (1.18-2.45)** **2.41 (2.27-4.56)** Harassment from the public 1.01 (0.84-1.20) **1.44 (1.26-1.65)** (Svedberg & Alexandesron, 2012) (Adjusting for age groups, gender, duration of employment and type of employment)
		There is no significant difference in taking sickness leave between male and female police officers exposed to these seven types of sexual harassment (Brown et al., 1995).

Table 2.6 continued

Exposure group	Exposure	Statistical findings
Work related factors	Violence	*Type of Violence* *Women* *Men* OR (95%CI) OR (95%CI) Threats or violence ≥ one time/year 1.02 (0.83-1.27) **1.45 (1.27-1.67)** Violence leading to injury ≥ once a year **3.02 (2.08-4.40)** **4.64 (3.75-5.74)** Violence leading to consultations with psychologist **5.07 (3.12-8.23)** **5.06 (3.60-7.12)** (Svedberg & Alexandesron, 2012) (Adjusting for age groups, gender, duration of employment and type of employment)
	Exposure to toxic chemical spills	Using t-test, there was no significant difference in mean hours of sick leave between cases (exposed to acutely toxic chemicals) and controls during any time period, from the day of response to one week following the response (English et al., 1989).
	Job demand, control and support	*Lost days* *SA Frequency* *STSA* OR (95% CI) OR (95% CI) OR (95% CI) Demand* 1.05 (0.65-1.71) 0.93 (0.57-1.53) 1.23 (0.70-2.17) Control* 1.04 (0.62-1.74) 0.86 (0.51-1.45) **0.50 (0.27-0.92)** Support* 0.86 (0.53-1.40) 0.77 (0.47-1.26) 0.63 (0.36-1.10) *High versus low (Magnavita & Garbarino, 2013) (Adjusting for age, length of service, education level, marital status, presence of children, housing, and rank.)
	Police stress	A significant effect of police stress on sickness absence **(F=4.54, P=0.03)** and the interaction between hardiness and police stress on sickness absence was also significant **(F=6.41, P=0.01)** (Tang and Hammontree, 1992)**.**

Table 2.6 continued

Exposure group	Exposure	Statistical findings
Work related factors	Effort/reward imbalance	*Lost days* *SA Frequency* *STSA* OR (95% CI) OR (95% CI) OR (95% CI) Effort* 1.62 (0.99-2.64) 1.54 (0.94-2.54) 1.21 (0.68-2.16) Reward* **0.57 (0.35-0.93)** **0.49 (0.30-0.82)** **0.50 (0.28-0.89)** *High versus low (Magnavita & Garbarino, 2013) (Adjusting for age, length of service, education level,marital status, presence of children, housing, and rank.)
	Exposure to passive smoking	OR for exposure to passive smoking (unexposed as baseline) *Exposed for long duration* *Exposed for short duration* OR (95% CI) OR (95% CI) Males **1.51 (1.19-1.91)** **2.04 (1.65-2.51)** Females 1.51 (0.90-2.53) **1.58 (1.00-2.49)** (McGhee et al., 2000) (Adjustment for age, marital status, level of education, rank, type of police officer, amount of alcohol consumed and passive smoking at home.
	Driving during the job	Significantly higher number of sickness absence days due to Musculoskeletal Diseases within last 12 months for those driving 25,000 miles (2.84 days) or over compared with those driving 15,000 miles and under (0.67 days) (Gyi and Porter, 1998).
	Fitness programme	A significant increase in sickness absence in police officers after one year and a half from the rehabilitation programme (5 SA days in the last 6 months) (Arokosi et al., 2002).
	Mandatory training	Mean number of sickness absence due to mandatory fitness training was 23 and 16 for females and males respectively. 48 out of the 92 injuries in 1995 lasted more than 14 days, two thirds of which (32) resulted from team or contact sports (De Loes and Jansson, 2002).

Table 2.6 continued

Exposure group	Exposure	Statistical findings
Work related factors	Career opportunities	Women were more likely than males to take sickness absence due to career progression frustration (**chi square=6.2, p<0.01**). No significant difference in taking sickness absence between male and female police officers due to unequal access to organisational benefits (Brown et al., 1995).
	Job sector	No statistically significant differences in average length of sickness absence spells pre and post disaster between the police, ambulance staff, firefighters and municipality personnel. (Dirkzwager et al., 2004)
		Police officers had the highest significant sickness absence when compared with hairdressers, loggers and female farmers. (5 SA days in the last 6 months) (Arokosi et al., 2002)
		The risk of sickness absence was significantly higher in police officers only and not in teachers (reference category: administrators); short term sickness (2-7 days) **OR=1.75** and long term (27 days or more) **OR=1.84.** (Ferrario et al., 2007)
	Shift work	Approximately one third reduction in absentee rate after six months of implementing the permanent shift work. (Phillips et al., 1991)
		Officers working night shift had higher risk of having ≥1 day of sickness absence than day or afternoon shift workers (**IRR= 2.04, 95%CI=1.56-2.68 and IRR= 1.69, 1.29-2.22** respectively) (fully adjusted model). Officers working night shift also had higher risk of having ≥3 day of sickness absence than day shift workers in the fully adjusted model **(IRR= 1.46, 95%CI=1.08-1.97**) (Fekedulegn et al., 2013A).

Exposure group	Exposure	Statistical findings
Work related factors	Type of employment	Civilians had a statistically non-significant decrease in risk of sickness absence compared with police (OR=0.98 (0.87-1.11) after adjusting for gender. When stratified by gender, males had a significant increase **(OR=1.24)** while females had a significant protective effect **(OR=0.83).** (Svedberg & Alexandesron, 2012) (adjusting for age groups, gender, duration of employment and type of employment)
	Manual work	No significant difference between attitudes of manual and non-manual workers to sickness absence. The Six elements Rijeka Absenteeism scale shows low reliability, Cronbach's a=0.236, Standardized a=0.324, X=23.58. (Lalic & Hromin, 2012)
	Overtime work	A one-hour increase in the total paid working hours was negatively associated with both one-day SA (**RR = 0.95, 95% CI= 0.92 – 0.98**) and three days or more of SA (**RR = 0.92, 95% CI= 0.89 – 0.95**) (Fekedulegn et al., 2013B)
	Exposure to major event at work	Officers with high exposure to the major manhunt event had significantly longer episodes of sickness absence than those with low exposure after adjusting for demographic variables (**OR=2.41, 95%CI=1.43-4.05**) (Hunt et al., 2013)

2.2 Systematic literature review two: the relationship between sickness absence and disability retirement: a systematic literature review

In this section, a systematic literature review of the available literature on the relationship between sickness absence and disability retirement is given. The methods used for this systematic review are similar to the previous systematic review.

2.2.1 Search strategy and results

The search was conducted between 15/01/2013 and 18/02/2013 and then updated between 02/01/2016 and 10/01/2016. The keyword search was carried out using the following keywords (the search was not restricted to any language or date):

• **Sickness absence**: sick* leave or absen*; medical* leave or absen*; ill* leave or absen*

• **Medical retirement**; retir* and medical* or earl* or ill* or incapacity* or disab*

The systematic search also included searching by the subject of interest, which was possible only in Medline, Embase and Psych Info (see Table 2.7). The final initial search results are shown in Table 2.8.

Table 2.7 Subject search strategy for the systematic review of all studies that evaluate the relationship between sickness absence and disability retirement

Variable	Search engines		
	Medline	**Embase**	**Psych Info**
Sickness absence	Sick leave/or absenteeism/or sickness absence.mp	Sickness absence.mp. or absenteeism/	exp employee absenteeism/or sickness absence.mp
Medical retirement	Retirement/or medical retirement.mp.	Retirement/or medical retirement.mp.	exp retirement/or medical retirement.mp.

Table 2.8 Total Numbers of resources found and search engine used for the systematic review of all studies that evaluate the relationship between sickness absence and disability retirement

Variable	Search engines						
	Medline	**Embase**	**Scopus**	**Psych Info**	**WOS**	**IBSS**	**Total**
Sickness absence AND medical retirement	528	874	754	172	1,265	107	3,700

2.2.2 Filtration processes

The number of resources remaining in the study after the first three filtration stages is demonstrated in Table 2.9. As in the first literature review, a hand search for potentially relevant resources was conducted (using resources available after the second sift). The resources were viewed in accordance with he sets of inclusion and exclusion criteria. The main inclusion criteria in examining the resources showing the relationship between sickness absence and disability retirement were that they should be prospective or retrospective analyses of the association or relationship between sickness absence and disability retirement and should use the latter variable as an outcome (event).

Resources were excluded mainly if they had other routes to early retirement as the main outcome and were not disability related and when the association between sickness absence and disability retirement was not investigated in the study.

Table 2.9 Results after the three stages of filtration for the systematic review of all studies that evaluate the relationship between sickness absence and disability retirement

Variables	Total before Filtration	Total after removal of duplicates	Total after first sift	Total after second sift
Sickness absence AND medical retirement	3,700	1,621	321	54

2.2.3 Final search results

Figure 2.2 demonstrates the results after each stage of filtration of the resources relating to the relationship between sickness and disability retirement. As can be seen from this figure, there were 321 resources after the first sift (eyeballing titles) and 54 after second sift (abstract sifting). Nine resources were then added after the hand search (tracking citation procedure) for all citations with each resource available after second sift. Therefore, the final number of resources available for next stage was 63. After a thorough investigation of all 63 resources, only 21 resources were included in the systematic review and the remaining resources were excluded for reasons described in Box 2.2.

Box 2.2: Reasons for excluding resources that evaluate the association between sickness absence and disability retirement.

a) Resource does not analyse the association between sickness absence and disability retirement (n=22)

b) Resource discusses factors associated with sickness absence and disability retirement (n=10)

c) Resource evaluates the association between sickness absence and other early retirement routes but not disability retirement (n=9)

d) Resource examines the association between sickness absence and early retirement intention (n=1)

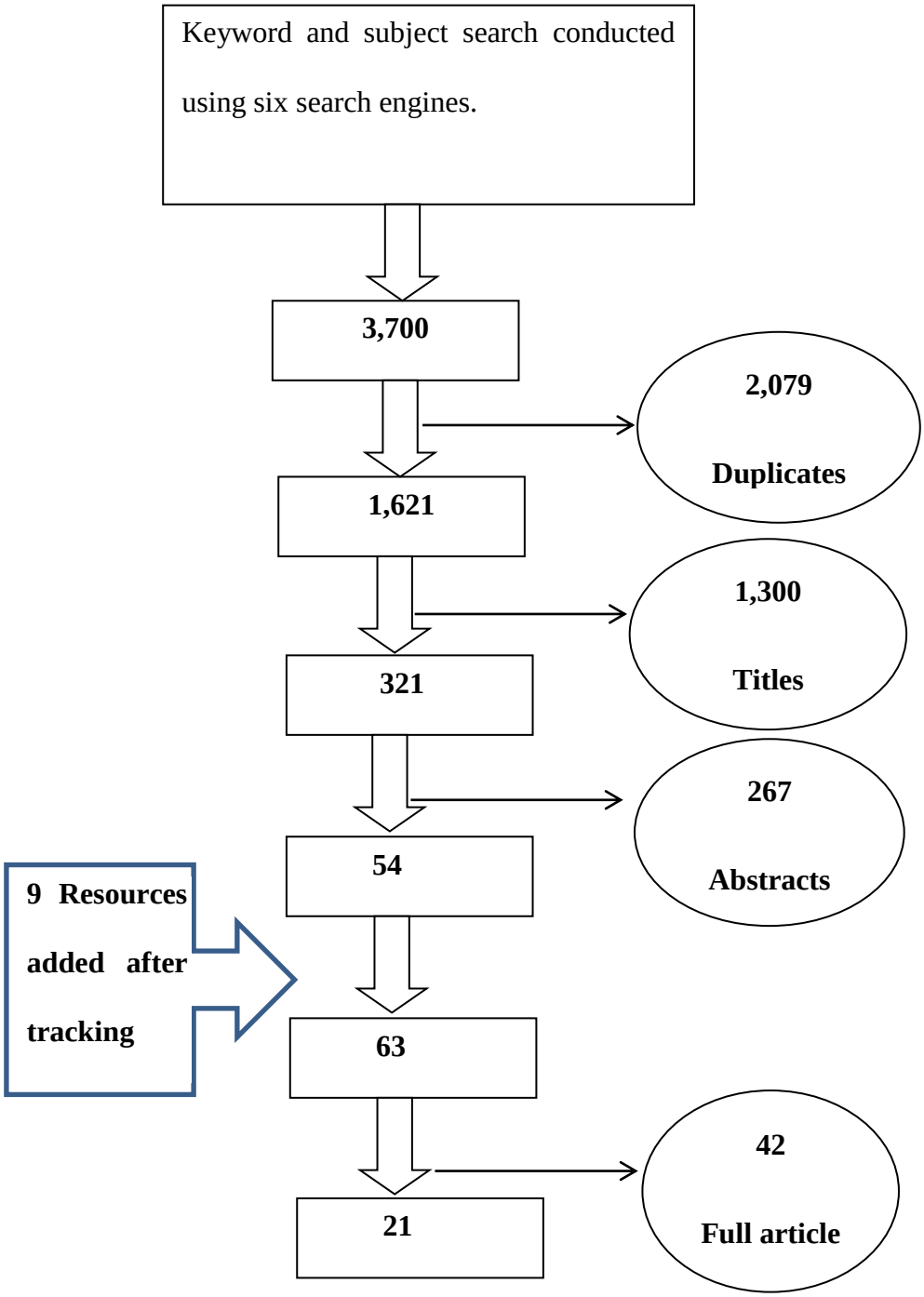

Figure 2.2 Stages of systematic search for resources that report on the relationship between sickness absence and disability retirement

▭ Stages of systematic literature search ⬭ Number of irrelevant resources after each stage

2.2.4 Summary of studies

A summary of all 21 relevant studies is provided in Table 2.10 (Please note that due to their relevance, a summary of resources excluded due to reasons c and d in Box 2.2 is included in Table A 2.3 (Appendix). All the relevant studies are evaluated in the next sections regardless of their quality.

Table 2.10 shows that all the 21 relevant studies, apart from the Polish studies of Szubert & Sobala, (2002 & 2003), were conducted in Scandinavian countries. All the studies adopted a cohort design, while one study (Wallman et al., 2009) reconfirmed its findings from the cohort study using a nested matched case control design.

The sample size of these studies ranged from 148 (Enthoven et al., 2006) to 254,905 (Brun et al., 2003) and the follow up period ranged from 1 year (Enthoven et al., 2006) to 16 years (Wallman et al., 2009), with a three year follow up period being the most common (Gjesdal & Bratberg, 2002 & 2003; Szubert & Sobala, 2002 & 2003; Brun et al., 2003; Virtanen et al., 2006).

Sixteen of the 21 relevant studies were carried out using a sample from the general working population, while the remaining five studies analysed the relationship between sickness absence and disability retirement by utilizing data on certain occupational groups, such as firefighters (Szubert & Sobala, 2002), industrial plant employees (Szubert & Sobala, 2002), patients (Enthoven et al., 2006), private employees (Lund et al., 2007) and nursing aides (Jensen et al., 2012).

The 21 relevant studies were published over a span of 13 years from 1999 (Biering-Sorensen et al., 1999) to 2012 (Jensen et al., 2012) with data collection starting between 1977 (Biering-

Sorensen et al., 1999) and 2000 (Ahola et al., 2011) and ending between 1992 (Biering-Sorensen et al., 1999; Szubert & Sobala, 2003) and 2007 (Ahola et al., 2011; Jensen et al., 2012).

In general, most of the 21 relevant studies utilized register-based data to analyse the relationship. Four studies used a self-reported measure of sickness absence (Biering-Sorensen et al., 1999; Enthoven et al., 2006; Labriola & Lund, 2007; Jensen et al., 2012) while a subjective measure of disability was used only by Enthoven et al. (2006).

As shown in Table 2.11, eight measures of sickness absence were used in the 21 relevant studies, namely, total number of sickness absence days in a certain period, number of spells of sickness absence, average length of sickness absence spells, medical diagnosis of sickness absence, rate of sickness absence, 10 days increase in sickness absence, time to next spell of sickness absence and occurrence of sickness absence (reported by yes/no). The most common measures used were the total number of days of sickness absence in a certain period (used by 14 studies) and the medical diagnosis of sickness absence (used by 11 studies).

The studies were also different with respect to the way in which the sickness absence records had been obtained and linked with the disability retirement data. The relationship was investigated according to the following four methods:

- An inclusion criterion is set where only those with a certain duration of the spell of sickness absence are included in the study. The resulting cases are then followed up until disability retirement is granted (Gjesdal & Bratberg, 2002 & 2003; Kivimaki et al., 2007; Gjesdal et al., 2008 & 2009) **(5 studies).**
- An inclusion criterion is set where only those with a certain duration of the spell of sickness absence spell (A) are included in the study and the resulting cases are then

followed up until disability retirement is granted. The difference this time is that in these studies, retrospective sickness absence records (prior to A) are included in the analyses (Borg et al., 2001; Borg et al., 2004; Gjesdal et al., 2004; Karlsson et al., 2008) **(4 studies).**

- Sickness absence data at the start of the study or during a certain period are recorded and the participants are then followed up until disability retirement is granted (Biering-Sorensen et al., 1999; Szubert & Sobala, 2002 & 2003; Enthoven et al., 2006; Virtanen et al., 2006; Labriola & Lund, 2007; Kivimaki et al., 2004; Lund et al., 2007; Ahola et al., 2011; Jensen et al., 2012) **(10 studies)**
- Sickness absence data are recorded throughout follow up until disability retirement is granted (Brun et al., 2003; Wallman et al., 2009) **(2 studies).**

Two of the 21 relevant studies adopted a cohort design with a 'wash out' period in which all the disability retirement cases that occurred in the period were ignored: the period lasted for 24 months (Lund et al., 2007) and 36 months after inclusion in the study (Labriola & Lund, 2007). A specific sickness absence inclusion criterion was often made to only follow up individuals with certain number of days of sickness absence such as, those with more than 7 days (Kivimaki et al., 2007), 28 days or more of sickness absence due to neck, shoulder and back problems (Borg et al., 2001 & 2004), > 8 weeks of sickness absence for any cause (Gjesdal & Bratberg, 2002; Gjesdal et al., 2004; Karlsson et al., 2008) or due to psychiatric condition (Gjesdal et al., 2008) or musculoskeletal diseases (Gjesdal et al., 2009), sickness absence lasting between 8 and 52 weeks (Gjesdal & Bratberg, 2003) and sickness absence due to low back pain (Enthoven et al., 2006) or mental disorders (Ahola et al., 2011).

Table 2.10 Summary of the twenty one relevant articles evaluating relationship between sickness absence and disability retirement by year of publication

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Biering-Sorensen et al., 1999, Denmark	To identify possible risk factors for granting disability retirement during a fifteen years period by use of health survey data.	Cohort followed up for 15 years	892 individuals living in the municipality of Glostrup in Denmark.	Survey, health measurement and register-based data.	Non-work factors, general health, occupational and social factors and reported sickness absence	Disability Pension	When compared with individuals with less than one week of sickness absence, those with more than 4 weeks of sickness absence had a statistically significant increase in risk of disability retirement (OR=5.0) while risk in those with 1-2 and 3-4 weeks of sickness absence was statistically non-significant (OR=1.2 and 1.6 respectively)
Borg et al., 2001, Sweden	To identify predictive factors for disability retirement among young workers initially sick-listed with back diagnoses.	Cohort followed up for 11 years. Past three years SA records included.	All individuals in a Swedish city in 1985 aged 25 – 34 who had a sick-leave spell of >28 days (n=213)	Register-based data	Diagnosis, sex, citizenship, occupation, socioeconomic group, income, marital status and duration of SA spell	Disability pension	Persons with 14 sick-leave days per spell had a 3.1 times higher risk of being granted a disability pension than those with 7 sick days per spell. Total of sick leave days was also associated with disability retirement (p=0.02) but not with number of spells (p=0.076).
Gjesdal and Bratberg., 2002, Norway	To identify factors that explain the transition from sickness absence into permanent disability retirement, with a special focus on the role of gender	Cohort followed up for three years	6,434 men and 8,233 women (Total=14,667) with long term sickness absence (LTSA).	Register-based data	Age, sex, sickness absence duration, marital status, number of children, SES and working hours.	Disability Pension	Duration of sickness absence is a significant predictors of disability retirement (OR=1.1). There were almost no overall gender differences in the transition from sickness absentees to disability retirement.

Continue Table 2.10

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Szubert & Sobala, 2002, Poland *(article in Polish)*	To identify major pathologies among fire fighters as being the cause of leaving the job	Cohort followed up for three years.	A sample of 1503 fire fighters, employed between 1994 and 1997 in 29 fire stations	Register-based data	Sickness absence spells and medical cause, work status and medical cause of disability	Disability pension and early retirement	SA among fire fighters who left the job because of disability and other early retirement was respectively 13 and 4 times higher than that of active fire fighters.
Brun et al., 2003, Denmark *(article in Danish)*	To identify socio-economic risk indicators among the Danish workers (aged 18 to 59) for being granted disability retirement.	Cohort followed up for three years	A random 10% sample of the Danish workers in 1995 (n=254,905)	Register-based data	Sociodemographic factors, sickness absence duration and benefits.	Disability pension	Having been on sick leave more than 13 weeks compared with sick leave for less than four weeks increased the risk for disability retirement significantly for men OR=11.5 and women OR=11.2
Gjesdal & Bratberg, 2003, Norway	To identify predictors for the transition from long-term sickness absence to disability retirement with special emphasis on diagnoses and the duration of sickness certificates.	Cohort followed up for 3 years after the long term spell	A random 10% of the Norwegian working population in 1990 (n=10,077)	Register-based data	Sociodemographic factors, diagnosis and duration of SA	Disability pension	Risk for disability retirement within three years is low (6-7%) for spells <170 days, unclear for spells between 170 and 270 days and increases rapidly after this to result in a 40% increase in risk for the maximum yearly duration (365 days). When compared with individuals with musculoskeletal disorders, a statistically significant increase in the risk of disability retirement was seen in males with mental (OR=1.4), circulatory (OR=1.5) and respiratory (OR=2.6) diseases and women with nervous/sensory diseases (OR=2.4).

Continue Table 2.10

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Szubert & Sobala, 2003, Poland *(article in Polish)*	To assess variations in sickness absence, its extent and morbid causes in persons who leave their jobs for various reasons	Cohort followed up for six years and three years.	An industrial plant between 1989-1994 (n= 8588) and between 1997 and 1999 (n=2702)	Register-based data	Sex, size of organisation and sickness absence (ratio and medical cause).	Disability pension and other exist routes.	The highest rate of sickness absence was noted in 1989-1994, when workers applied for or left due to disability. This rate accounted for about 25%, which means that those workers had failed to work one quarter of the required time. Highest sickness absence ratio for leaving the job due to health problems was seen in circulatory disease related absence for males and females (8.8 and 7.5 respectively)
Borg et al., 2004, Sweden	To determine whether the differences in risk of disability retirement observed in a previous study of the same cohort would remain if more recent data on sickness absence were used.	Cohort followed up for 11 years	All individuals in a Swedish city in 1985, aged 25 – 34 who had >28 days SA spell (n=213).	Register-based data	Sex, citizenship, duration of spells (above 28 days).	Disability pension	Presence of spell of >90 days in the previous two years increases risk of disability retirement by 9.3 times.
Gjesdal et al., 2004, Norway	To retest the importance of several socio-demographic factors among long-term sickness absentees as predictors for disability retirement.	Cohort followed up for five years. Past three years sickness absence included.	3,628 Norwegian long-term sickness absentees followed between 1994 and1999	Register-based data.	Socio-demographic factors, medical variables including days of sickness absence and medical absence diagnosis.	Disability pension.	Compared with those who had no sickness absence between 1990 and 1993, individuals with long term sickness absence in 1994 who had 101-250 or >250 sickness absence (1990-1993), had a statistically significant increase in risk of disability retirement at follow up respectively (RR for males=1.60 and 1.7) and (RR for females=1.5 and 2.5). A significant increase in risk was seen in women with mental diseases compared with women with musculoskeletal diseases (RR=1.5).

Continue Table 2.10

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Kivimaki et al., 2004, Finland	To determine whether sickness absence data may be used as a risk marker of future disability retirement	Cohort followed up for five years	46, 569 Finnish full time municipal employees	Register-based data	Gender, disease, number of sickness spells per employee and duration of absence.	Disability pension.	In the fully adjusted model, individuals with more than one long term sickness absence spell (compared with 0) and those with more than 15 days of sickness a year (compared with 0) had a statistically significant increase in the risk of disability retirement (Men HR=3.5 and 2.4 respectively) (Women HR=4.2 and 3.4 respectively)
Enthoven et al., 2006, Sweden	To assess the independent predictive value of a number of potential predictive factors for disability at the 1-year and 5-year follow-ups.	Cohort followed up for 1 and 5 years	148 patients eligible for sick-leave benefits.	Survey data	Demographic factors self-rated heath, physical activity, measures of pain, disability and sick leave.	Disability at 1 ad 5 year follow up	After adjusting for all explanatory variables, the risk of disability retirement due to sickness absence was statistically non-significant in the two follow up periods.
Virtanen et al., 2006, Finland	To examine whether sickness absence puts temporary workers at greater risk of job loss (including disability retirement) than workers with a permanent contract.	Cohort followed up for three years	19,093 temporary and 41,530 permanent public sector employees (Total=60,623)	Register-based data.	Age, gender, type of job contract and sickness absence (low/high)	Disability pension and other work exit routes.	In 2000, the risk of disability retirement significantly increased for men and women with high or low sickness absence in 1996, except for temporary men workers between 41-54 years of age. The risk in younger men and women (16-40) was statistically non-significant.

Continue Table 2.10

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Kivimaki et al., 2007, Sweden	To investigate diagnosis-specific sick leave as a risk marker for subsequent disability retirement.	Cohort followed up for 11 years	176, 629 non-retired, alive and not on disability pension Swedish workers	Register-based data	Gender, age, marital status, sickness absence duration and diagnosis.	Disability pension.	Sick leave for mental disorders predicted a 14-fold higher risk of disability retirement for mental disorders. The corresponding risk ratio for sick leave and disability retirement was 13 for gastrointestinal diseases and >6 for musculoskeletal diseases. A medically certified sick leave episode for any cause was associated with a 3.3-fold increased risk of disability retirement.
Labriola & Lund, 2007, Denmark	To evaluate the associa-tions between days of self-reported sickness absence and future disability retirement in a sample of Danish employee in 1990	Cohort followed up for 14 years	4177 Danish employees between 18 and 45 years in 1990.	Survey and register-based data	Age, gender, SES, reported sickness absence, health and lifestyle and work factors.	Disability pension	Participants with 1-2, 3-6 and >6 days of sickness absence at baseline were compared with those with no sickness absence and the risk of disability retirement was found to be significantly increased only in those with more than 6 days of sickness absence (OR=2.51, 95% CI= 1.58-3.90).
Lund et al., 2007, Denmark	To examine the associations between duration of sickness absence and future disability retirement in the Danish private sector in 1998.	Cohort followed up for 6 years.	All private sector employees in 1998 (n=225,056 persons)	Register-based data	Age, gender, immigration status and duration of sickness absence compensation (SAC)	Disability pension	There was a significant stepwise increase in risk of disability retirement according to the duration of SAC, peaking at 26 or more weeks, where the hazard ratio was 6.65 for women (95% CI= 5.77-7.66) and 7.57 for men (95% CI= 6.56-8.74) compared with those with one week of SAC.

Continue Table 2.10

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Gjesdal et al., 2008, Norway	To identify diagnostic and socioeconomic predictors of the transition to DR in individuals with >8 weeks of SA due to psychiatric conditions.	Cohort followed up for 5 years	A sample of Norwegians with > 8 weeks of sickness absence due to psychiatric conditions in 1994 (n= 517)	Register-based data	Age, gender, SES, clinical sickness absence diagnosis, residence and certifying physician.	Disability pension	There was a statistically higher risk of DR in individuals with >8 weeks of SA at baseline due to psychosis compared with those with depression (HR=3.6, 95% CI= 2.2-5.8) A non-significant increase in risk was seen in individuals with anxiety (HR=1.4, 95%CI= 0.8-2.3) and alcohol and substance use disorders (HR=1.2, 95%CI= 0.6-2.4).
Karlsson et al., 2008, Sweden	To examine the association between sick-leave diagnosis and the risk of disability retirement among individuals on long term sickness absence (LTSA) in Sweden (>56 days)	Cohort followed up for 0-5 and 6-10 years.	A total of 19379 individuals (43% men) from a Swedish county.	Register-based data	Age, mean sickness absence days, sickness absence diagnosis, SES factors and presence of children	Disability pension	There was a graded statistically significant increase in the risk of disability retirement with an increase in the mean number of sickness absence for males and females for the two follow up periods of 0-5 years and 6-10 years (reference group <7 days SA).
Gjesdal et al., 2009, Norway	To identify the diagnostic and socioeconomic predictors of DR in individuals with >8 weeks SA due to musculoskeletal disorders.	Cohort followed up for 5 years.	Norwegian individuals with > 8 weeks of sickness absence due to musculoskeletal disorders in 1997 (n=64,249)	Register-based data	Age, gender, SES factors, and clinical musculoskeletal diagnosis.	Disability pension	Compared with individuals with LTSA due to fractures and injuries and after adjusting for age, education and income, the relative risk of disability retirement was significantly highest in those with LTSA due to rheumatoid arthritis (HR=4.2), followed by myalgia/fibromyalgia (HR=3.3), osteoarthritis (HR=2.8), back problems (HR=2.0) and upper limb problems (HR=1.5)

Continue Table 2.10

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Wallman et al., 2009, Sweden	To test the efficacy of sick-leave track record as a predictor of being granted a disability retirement.	Cohort followed up for 16 years.[1]	8,218 individuals from five population studies.	Register-based data	Sex, marital status, age, smoking status, number of sickness absence spells, their duration, sickness spells interval and one-year sickness absence.	Disability pension	Duration of a single spell of sickness absence (10 day-periods) and cumulative annual sick leave days (10-day period) significantly increased the risk of disability retirement (OR=1.1 and 1.2 respectively)
Ahola et al., 2011, Finland	To examine the association between common mental disorders at baseline and future disability retirement.	Cohort followed up for 7 years.	3,164 participants from the Finnish Health Study 2000.	Health examination, survey and register-based data	Mental disorders, physical illnesses, SES, work factors, lifestyle and compensated sickness absence.	Disability pension	Compared with participants with no sickness absence at baseline, those with 1-30 days and those with >30 days of sickness absence had a statistically significant increase in the risk of disability retirement (OR=2.94 and 7.10 respectively) in the fully adjusted model.
Jensen et al, 2012, Denmark	To estimate the extent of early retirement and disability retirement and compare their predictors	Cohort followed up for 15 years.	3,332 nurses in Dutch Aarhus county followed up between 1993 and 2008.	Survey and register-based data	Demographic factors, job control demand, lifestyle, reported sickness absence and medical reason for absence.	Disability pension and early retirement.	Significant increase in risk of disability retirement for individuals with sickness absence of >90 days due to LBP, >30 days due to upper or lower limb disorders (HR=2.27, 2.18 and 1.51 respectively). A significant increase in risk of disability retirement for gastrointestinal and rheumatologic diseases were also found (HR=1.4 and 2.4 respectively).

[1] This study also included a nested case control design where 1498 cases of disability retirement were matched with two controls (one with age, sex and geographical region and the other with age and sex only) and then sickness absence records were compared retrospectively. The results of both the cohort design and the nested case control study are provided.

Table 2.11 Sickness absence measures used in the 21 relevant studies according to frequency of use (high-low)

Number	Sickness absence measure (frequency of use, highest to lowest)	Authors
1	**Total number of sickness absence days (14)**	(Biering-Sorensen et al., 1999; Borg et al., 2001 & 2004; Gjesdal & Bratberg, 2002 & 2003; Brun et al., 2003; Gjesdal et al., 2004; Kivimaki et al., 2004; Labriola & Lund, 2007; Lund et al., 2007; Karlsson et al., 2008; Wallman et al., 2009; Ahola et al., 2011; Jensen et al., 2012)
2	**Medical diagnosis of sickness absence (11)**	(Szubert & Sobala, 2002 &2003; Gjesdal & Bratberg, 2003; Gjesdal et al., 2004, 2008 & 2009; Kivimaki et al., 2004 & 2007; Karlsson et al., 2008; Wallman et al., 2009; Jensen et al., 2012)
3	**Number of sickness absence spells (2)**	(Borg et al., 2001; Kivimaki et al., 2004)
4	**Rate of sickness absence (2)**	(Szubert & Sobala, 2002 &2003)
5	**Dummy variable (2)**	(Enthoven et al., 2006 (Yes/No sickness absence); Virtanen et al., 2006 (high/low sickness absence)
6	**10 days increase in sickness absence (2)**	(Labriola & Lund, 2007; Wallman et al., 2009)
7	**Average length of sickness absence spells (2)**	(Borg et al., 2001; Wallman et al., 2009)
8	**Time to next sickness absence spell (1)**	(Wallman et al., 2009)

2.2.5 Summary of findings

a) Disability retirement cases in the 21 relevant studies

Table 2.12 shows the sample size, number and percentage disability retirement for all samples and for males and females separately for the 21 relevant studies. Eleven of the 21 relevant studies examined five specific types of population, namely, individuals with long term sickness absence (Borg et al., 2001; Gjesdal & Bratberg, 2002; Borg et al., 2004; Gjesdal et al., 2004; Gjesdal et al., 2008; Karlsson et al., 2008; Gjesdal et al., 2009), patients (Enthoven et al., 2006), nurses (Jensen et al., 2012), firefighters (Szubert & Sobala, 2002) and industrial plan employees (Szubert & Sobala, 2003).

The percentages of disability retirement in the latter four groups are listed in the table. Regarding individuals with long term sickness absence (inclusion criteria in these studies), the percentage incurring disability retirement ranged from 13% (Gjesdal & Bratberg, 2002) to 41% (Karlsson et al., 2008) with a mean disability retirement percentage of 23% (total sample size=102,866 and total number of disability retirement cases=23,394). There was almost a 10% increase in the percentage taking disability retirement in females (12,959 cases (55.3%)) compared with males (10,437 cases (44.6%)) in these seven studies.

The percentage taking disability retirement for the remaining 10 studies (in the general population) ranged from 0.5% (Virtanen et al., 2006) to 18% (Wallman et al., 2009). Five of these 11 studies (Brun et al., 2003; Kivimaki et al., 2004; Virtanen et al., 2006; Labriola & Lund, 2007; Lund et al., 2007) had a range of percentages of those taking disability retirement between 0 and 5%, three studies showed between 6% and 10% (Biering-Sorensen et al., 1999; Kivimaki et al., 2007; Ahola et al., 2011), while the percentages of disability retirement in Gjesdal & Bratberg, (2003) and Wallman et al. (2009) were 14% and 18% respectively.

The mean percentage of disability retirement in these studies of a general population is 3.5% (total sample size=790,400 and total number of disability retirement cases=27,743). The percentage of disability retirement cases in females was also higher than for males in the general population studies (56.6% (13,174) and 43.4% (10,126) respectively) (Note that Brun et al. (2003) did not report the number of disability retirement cases separately for males and females and, hence, were not included in the calculations leading to the previous statement).

Table 2.12 Sample size, number and prevalence (%) of disability retirement cases and percentage of disability retirement cases who are male and female.

Author	Sample size	Total number of disability retirement (%)	Disability retirement	
			% Males	% Females
Biering-Sorensen et al. (1999)	892	84 (9.4)	46.4	53.6
Borg et al. (2001)	213	47 (22)	25.5	74.5
Gjesdal & Bratberg, (2002)	14,667	1,863 (12.7)	44.6	55.4
Szubert & Sobala, (2002)	1,503	214 (14.2)	100.0	0.0
Brun et al. (2003)	254,905	4,443 (1.7)	Not stated	Not stated
Gjesdal & Bratberg, (2003)	10,077	1,422 (14)	45.2	54.8
Szubert & Sobala, (2003)	8,588	51 (0.8)	Not stated	Not stated
Borg et al. (2004)	213	47 (34.7)	25.5	74.5
Gjesdal et al. (2004)	3,628	849 (23.4)	42.2	57.8
Kivimaki et al. (2004)	46,659	1,414 (3)	30.3	69.7
Enthoven et al. (2006)	148	Various reported % of disability	Not applicable	Not applicable
Virtanen et al. (2006)	60,623	300 (0.5)	42.3	57.7

Table 2.12 continued

Author	Sample size	Total number of disability retirement (%)	Disability Retirement	
			%Males	%Females
Kivimaki et al. (2007)	176,629	12,540 (7)	39.5	60.5
Labriola & Lund, (2007)	4,177	140 (3.3)	41.4	58.6
Lund et al. (2007)	225,056	5,694 (2.5)	53.4	46.6
Gjesdal et al. (2008)	517	143 (27.6)	44.8	55.2
Karlsson et al. (2008	19,379	7,864 (40.5)	41.9	58.1
Gjesdal et al. (2009)	64,249	12,581 (19.5)	46.6	53.4
Wallman et al. (2009)	8,218	1,498 (18.2)	49.7	50.3
Ahola et al. (2011)	3,164	208 (6.5)	44.7	55.3
Jensen et al. (2012)	3,332	540 (16.2)	1.3	98.7

b) Sickness absence and risk of disability retirement

This section evaluates the findings from the 21 relevant articles with respect to the risk of disability retirement due to sickness absence. During statistical testing of the latter relationship, different adjustment factors were added to testing models. These confounding factors and factors used to stratify results in the 21 relevant studies are described in Table 2.13. It can be seen from Table 2.13, that the most common adjustment factors added to statistical models were age, gender and SES while the results of the 21 relevant studies were mostly stratified by gender.

As shown in Table 2.13, 14 of the 21 relevant articles have evaluated the relationship between sickness absence and disability retirement using the 'total number of days of sickness absence' measure. Three of these 14 studies used a self-reported measure of sickness absence (Biering-Sorensen et al., 1999; Labriola & Lund, 2007; Jensen et al., 2012) while the remainder utilized register-based data. Two of the 14 studies used the number of weeks of sickness absence (Biering-Sorensen et al., 1999; Lund et al., 2007) which were translated into days of sickness absence in the analysis below.

In general, all of these studies found that the total number of sickness absence days increases the risk of disability retirement. There was a statistically significant increase in the risk of disability retirement for sickness absence (compared with the reference group in each study) of more than 1d (1 day) (Ahola et al., 2011), 6ds (Labriola & Lund, 2007), 7ds (Karlsson et al., 2008; Borg et al., 2001), 15ds (Kivimaki et al., 2004), 28ds (Biering-Sorensen et al., 1999), 31ds (Jensen et al., 2012), 90ds (Borg et al., 2004; Brun et al., 2003), 101ds (Gjesdal et al., 2004) and 281ds (Gjesdal & Bratberg, 2003).

The risk also increased significantly by 1% and 16% in studies (Gjesdal & Bratberg, 2002; Wallman et al., 2009) evaluating the risk of disability retirement using a continuous measure of the number of days of sickness absence (measure number 6 in Table 2.11). Adjustment models were added only in four of these studies. Lund et al. (2007) adjusted only for age, while Kivimaki et al. (2004) adjusted results for age, socio-economic status, town and other sickness absence measures. Labriola and Lund et al. (2007) and Ahola et al. (2011) adjusted additionally (excluding sickness absence measure) for health behaviours, work factors and clinical factors (not valid for Lund et al., 2007).

Eleven of the 21 relevant studies (Table 2.11) evaluated the relationship between medical causes of sickness absence and the risk of disability retirement. Two of these (Szubert &

Sobala, 2002 & 2003) described only the frequency of various medical causes of sickness absence in relation to various employment termination routes (including disability retirement) without calculating the statistical risk and hence is not be discussed below.

In general, the risk of disability retirement increased significantly in individuals with sickness absence due to mental diseases (Gjesdal & Bratberg, 2003; Gjesdal et al., 2004; Kivimaki et al., 2007; Karlsson et al., 2008; Wallman et al., 2009), Rheumatoid Arthritis (Gjesdal et al., 2004 & 2009; Jensen et al., 2012), Fibromyalgia (Gjesdal et al., 2004 & 2009), psychosis (Gjesdal et al., 2008) and nervous and gastrointestinal diseases (Kivimaki et al., 2007; Jensen et al., 2012).

The results are mixed with respect to the risk of disability retirement due to sickness absence related to cardiovascular and respiratory disease. For example, in the Norwegian study of Gjesdal et al. (2004), individuals with cardiovascular diseases related absence had a non-significant increase in the risk of disability retirement compared with those who were absent due to musculoskeletal diseases (RR=1.56 for women and 1.19 for men), while another Norwegian study, by Gjesdal & Bratberg, (2003) found a statistically significant increase in risk of disability retirement by 49% in individuals with sickness absence due to circulatory diseases, compared with those with musculoskeletal diseases. Surprisingly, some sickness absence related diseases have a protective effect of disability retirement such as pregnancy for women (Gjesdal & Bratberg, 2003; Gjesdal et al., 2004; Karlsson et al., 2008).

Two studies out of the 21 relevant studies examined the association between the number of sickness absence spells and the risk of disability retirement, of which one found that the number of sickness absence spells is not a predictor of disability retirement (Borg et al., 2001), whereas the other study by Kivimaki et al. (2004) found a significant increase in the risk of disability retirement in individuals with more than one long term sickness absence

spell (1-3 days) compared with those with no such spells (HR=3.5 and 4.2 for men and women respectively) in the fully adjusted model.

Two of the 21 relevant studies evaluated the relationship between the average length of sickness absence spells and the risk of disability retirement. In both of these studies, this sickness absence measure was found to be a predictor of disability retirement.

The Swedish study of Borg et al. (2001) found that individuals with an average length of sickness absence spells of 14d or more (compared with those with less 7 days or less) had a statistically significant increase in the risk of disability retirement (RR=3.1, 95% CI=1.46-6.60). Wallman et al. (2009), for their part, on the other hand, found a significant increase in risk of disability retirement by 10% when the average length of sickness absence spells increases by 10 day-periods.

Two studies have evaluated the risk of disability retirement using a dichotomous measure of sickness absence. In the study of Enthoven et al. (2006), participants were asked whether they had a sickness absence due to back problems (yes/no) and were then followed up for 1 and 5 years. In both follow up periods, sickness absence was not a significant predictor for disability retirement. In another study by Virtanen et al. (2006) participants were classified according to the duration of sickness absence into high (>15 days of sickness absence) or low (0-15ds) and the results were classified according to this measure, their gender and their employment contract status. The results of the study were mixed (please refer to the summary of this study in Table 2.10)

Finally, only one study included ‘time to the next spell’ as a measure of sickness absence (that is, the time between one sickness absence spell and the next). In this study, Wallman et al. (2009) found this measure to be a strong predictor of disability retirement. The mean

interval time for cases of disability retirement was 111ds for women and 128ds for men compared with 198ds and 221ds for the controls, respectively.

Table 2.13 Adjustments and stratification factors used in the 21 relevant studies that examined the association between sickness absence and disability retirement.

Author	Adjustments factors	Results stratified by
Biering-Sorensen et al. (1999)	Not applicable.	Not applicable.
Borg et al. (2001)	Not applicable.	Not applicable.
Gjesdal & Bratberg, (2002)	Not applicable.	Gender
Szubert & Sobala, (2002)	Age and duration of employment	Medical cause of sickness absence
Brun et al. (2003)	Not applicable.	Gender
Gjesdal & Bratberg, (2003)	Not applicable.	Gender
Szubert & Sobala, (2003)	Not applicable.	Medical cause of sickness absence
Borg et al. (2004)	Not applicable.	Not applicable.
Gjesdal et al. (2004)	Not applicable.	Gender
Kivimaki et al. (2004)	Age, SES, employment contract, town and other sickness absence measures	Gender
Enthoven e al., (2006)	Not applicable.	Follow up period
Kivimaki et al. (2007)	Age, gender and marital status	Follow up period
Labriola & Lund, (2007)	Age, gender, SES, health behaviour and work factors.	Gender
Lund et al. (2007)	Age	Gender
Gjesdal et al. (2008)	Age, gender and income	Gender
Karlsson et al. (2008)	Not applicable.	Gender, follow up period
Gjesdal et al. (2009)	Age, gender, marital status, SES, house hold size and smoking	Income and education
Wallman et al. (2009)	Age, gender, SES, work factors, health behaviour and clinical treatments.	Gender and disability retirement status
Ahola et al. (2011)	Not applicable.	Not applicable.
Jensen et al. (2012)	Not applicable.	Not applicable.

2.3 Discussion and conclusion

This section provides an overall summary and discussion of the findings of each of the two systematic reviews as well as discussing general limitations of the previous literature.

2.3.1 Systematic review one; studies investigating sickness absence in the police.

The cross-sectional study design was the most common design (implemented by 19/32 studies) which could mean that the police organizations avoid using study designs (particularly cohort design) which may provide information regarding the police force that are considered sensitive or confidential. Many police officers often spend their working time in the field which could make it difficult for researchers to use cohort studies as the number of drop outs are likely to increase. Hence, this could additional explain the more frequent use of cross-sectional studies in the police.

On the other hand, the majority of studies included (19/32) were published between 2000 and 2015 which reflects the growing importance of evaluating sickness absence and its determinants in this occupation. In addition, in a few of the studies (2/18), the number of female officers in the study sample was larger than their male counterparts which confirms previous findings that the police job is a male-dominated occupation.

Only two studies were conducted in the Asian continent; one in Hong Kong (McGhee et al., 2000) and the other in Israel (Weil et al., 2004). Because of the demographic, organizational and structural differences, the findings of the Israeli study may not necessarily be generalized to other police departments in the Middle East. There has been no published literature on sickness absence in the police in the Arabian Gulf Corporation Council despite the growing importance of this topic.

As for work exposures and sickness absence, the systematic review of studies on sickness absence in the police have shown that previous studies focused mainly on evaluating the effect of the exposure to violence, passive smoking and discrimination on sickness absence but did not examine other more common physical work exposures such as ergonomics, noise, vibration and repetitive movements. On the other hand, only one study evaluated the influence of psychosocial work environment on sickness absence using the job control, demand and support model and the effort/reward imbalance model (Magnavita & Garbarino, 2013). However, generalizing the findings of this study is considered to be difficult for many reasons. For example, the study had a small sample size (n=290) and only included police officers who were involved in maintain law and order during a major event (the Genoa G8 Summit in 2009).

The sample also included mainly senior officers with not less than six years of experience. The study was carried out in Italy and the findings could still be generalized to other police departments, particularly in Europe, because labor laws and social contexts are relatively similar. However, generalizing Magnavita & Garbarino's (2013) findings to police departments outside the European continent (in the Middle East for example) is questionable. The study of Magnavita & Garbarino (2013) also evaluated the influence of the effort reward imbalance on sickness absence.

Furthermore, the literature on the job control-demand-support model and sickness absence are much more extensive than that of the effort-reward imbalance model and sickness absence. Evaluating effort-reward balance in a Middle Eastern police force may not also be allowed because it may be considered as a direct indication of officers' satisfaction with the job (the reward element in particular). Thus, the job-control-demand-support model is more

appropriate when evaluating the influence of the psychosocial work environment on sickness absence of police officers in the Middle East.

2.3.2 Systematic review two: the relationship between sickness absence and disability retirement

Most of the studies were conducted in Scandinavian countries which makes it difficult to generalize the findings to other populations since Scandinavian countries have generous social insurance schemes and low wage inequality (Andersen, 2011). Majority of the previous studies on the relationship between sickness absence and disability retirement used samples from the general population and only five out of the 21 relevant studies used specific population samples, none of these were from the police force. The study of Szubert & Sobala (2002) evaluated the relationship using a sample of firefighters, which is considered the closest sample to the police. This study found that firefighters who were granted disability retirement had 13 times higher sickness absence than those who are still active in the service.

On the other hand, the most common measures of sickness absence used in the 21 relevant studies were the total number of days of sickness absence and the medical diagnosis of sickness absence. Total number of days of sickness absence generally predicted disability retirement. The risk of disability retirement increased in individuals with sickness absence due to mental, musculoskeletal, nervous and gastrointestinal diseases but the findings regarding those with sickness absence due to cardiovascular and respiratory diseases were mixed.

Other less commonly used sickness absence measures include the number of sickness absence spells and the average length of sickness absence spell. The findings of the two studies which evaluated the association using the number of sickness absence spells were contradictory (Borg et al., 2001; Kivimaki et al., 2004) while the average length of sickness

absence spell was a predictor of disability retirement (Borg et al., 2001; Wallman et al., 2009). More studies are needed to provide further insights into the relationship between the number of sickness absence spells and the average length of sickness absence spells and the risk of disability retirement.

Previous studies found that the risk of disability retirement increases in females and older individuals (Gjesdal et al., 2004; Karlsson et al., 2008; Sutinen et al., 2005; Nicolle et al., 2008). The risk of sickness absence also increases with age (Ahola et al., 2008; Gjesdal et al., 2004), and in females (North et al., 1996; Kivimaki et al., 1997). Despite these findings, only four out of the 21 relevant studies added demographic adjustments when evaluating the relationship between sickness absence and disability retirement.

2.3.3 Limitations of previous literature

These two systematic reviews have identified several gaps and limitations of previous research on both determinants of sickness absence in the police and the association between sickness absence and disability retirement. First, the systematic review of studies which evaluate sickness absence in the police concluded that few studies investigated the influence of work-related exposures such as job control/demand, social support at work and physical working conditions on sickness absence and early retirement intentions (Tables 2.5 and 2.6). These work factors predicted sickness absence in other occupational groups such as nursing staff (Bourbonnais & Mondor, 2001; Trybou et al., 2014) and factory employees (Arola et al., 2003; Otsuka et al., 2007; Niedhammer et al., 1998).

Secondly, the impact of employees' perceptions of occupational health and safety management systems at work on sickness absence and early retirement intentions have not been investigated previously. Thirdly, few studies have examined determinants of sickness

absence, disability retirement and early retirement intentions in the Middle East in general and in the police in specific. For example, in the two systematic reviews (one and two of this chapter) only one study was carried out in the region (Weil et al., 2004) (Tables 2.4 and 2.10)

Next, another drawback of the literature is that, despite its wide application in measurement of psychosocial work environment, the Karasek model of job control, demand and support has never been translated and validated into Arabic in the literature.

Furthermore, despite the high rate of disability retirement and sickness absence in the police forces (HM Treasury, 2000; Arnett and Emerson, 2001) the systematic review of all studies investigation the relationship between sickness absence and disability retirement showed that no studies have been conducted to evaluate sickness absence and the risk of disability retirement in the police (Table 2.10). Moreover, the systematic review on the relationship between sickness absence and disability retirement also showed that most of the previous studies have adjusted for age and gender and only one study adjusted additionally for other sickness absence measures (Kivimaki et al., 2004) (Table 2.13).

In addition, this systematic review showed that the majority of studies evaluated the relationship between sickness absence and disability retirement using two sickness absence measures, namely, the duration of sickness absence and medical cause of sickness absence and only two of the 21 relevant studies examined the relationship using number of sickness absence spells, average length of sickness absence spells and 10-days increase in duration of sickness absence (Table 2.11). Finally, although many studies investigated the influence of duration of sickness absence on disability retirement, none of the previous studies quantified the effect to describe the number of days of sickness absence needed to obtain a certain probability of disability retirement (Wallman et al., 2009).

Chapter 3: Aims, objectives and hypothesis

Due to the complexity of their operational activities and working environment, the rate of sickness absences, early retirement and occupational injuries in organisations such as the police, fire fighting and other emergency response services are higher than in other organisations (Houser et al., 2004; Health and Safety Executive (HSE), 2015; Arnett & Emerson, 2001; Summerfield et al., 2011). For example, the average annual rate of disability retirement across the UK police forces was approximately 12 per 1000 in the late 1990s (HM Treasury, 2000) but then reduced by half in the early 2000s (Crawford and Disney, 2013). On the other hand, two million days were lost due to sickness absence in all UK police forces in the year 1999/2000. More than two-thirds of these days (1.4 million) were lost by police officers while 0.7 million days of sickness absence were recorded for civilian staff working in the police force, with an average of 12.1 and 12.5 days per employee per year respectively. These average number of days lost per employee are a third greater than the average number of working days lost for employees of civil services in the UK (Arnett and Emerson, 2001).

Police officers continuously encounter psychologically stressful situations and often work on dangerous tasks while performing their regular duties maintaining law and order (Nirkko et al., 1982; Soininen, 1995): it is an intrinsically hazardous occupation. This explains the high psychological stress experienced by police officers in comparison to other occupations (Collins and Gibbs, 2003; Juniper et al., 2010). Prolonged stress is associated with sickness absence (Kivimaki et al., 1997; Houtman et al., 1994; Virtanen et al., 2007) and early medical retirement (Summerfield, 2011). Despite this, few studies were conducted to evaluate work predictors of sickness absence (Körlin et al., 2009; Svedberg and Alexanderson, 2012), disability retirement and early retirement intention in the police.

Thus, a thorough evaluation of rates and determinants of these outcomes may assist the police force to prioritise plans and improve the health and wellbeing of officers, in turn, contributing to strengthening the fight against crime and minimizing the number of occupational injuries and premature exit from paid work.

General limitations of previous literature have been discussed in Section 2.3 of Chapter Two. In summary, previous literature is limited due to three main reasons. First, the majority of studies investigating the relationship between sickness absence and disability retirement used the number of days of sickness absence or medical cause of sickness absence measures and few studies evaluated the relationship using other sickness absence measures such as number of sickness absence spells or average length of sickness absence spells. Secondly, few studies have been carried out to evaluate the relationship between sickness absence and the risk of early retirement intentions. Thirdly, only a small number of studies have been carried out to evaluate the association between work factors and the risk of sickness absence in the police or the association between work factors and early retirement intentions in general.

This research aimed to overcome these limitations by evaluating the relationship between sickness absence and disability retirement using various measures of sickness absence. This research also examined the association between sickness absence and early retirement intentions and also evaluated the influence of work factors on sickness absence and early retirement intentions.

The aims, objectives and hypotheses of this research are described in this chapter. This is followed by an overview of the three main research phases (full PhD thesis).

3.1 Aims

- To investigate whether sickness absence data can be used to predict future disability retirement and early retirement intentions.

- To evaluate the influence of work factors, in particular psychosocial and physical factors and employees' perception of the health and safety management systems implemented by the organisation, on sickness absence and early retirement intentions in the Abu Dhabi Police.

3.2 Objectives

The objectives of the study were:

1) To evaluate the influence of various sickness absence measures including sickness absence spells, number of days of sickness absence and average length of sickness absence spells on the prediction of disability retirement using data from the Abu Dhabi Police **(Chapter Four)**.

2) To examine the magnitude of relationships of objective (1) and evaluate the influence of the total number of sickness absence spells on the risk of disability retirement by controlling for the total number of days of sickness absence and vice versa **(Chapter Four)**.

3) To develop and validate the Arabic version of the Karasek's Job Content Questionnaire (JCQ) (**Chapter Five)**:

a. To conduct a linguistic validation for the Arabic JCQ; this includes forward (English to Arabic) and backward (Arabic to English) translations, followed by cognitive interviews and a review from an external Arabic language expert.

b. To conduct a psychometric validation for the Arabic JCQ including comparison of means of the three scales of job control, job demand and support with that of other populations, internal consistency testing and evaluation of the construct validity.

4) To evaluate the association and magnitude of the potential relationship between work factors; psychosocial, physical and employees' perceptions of health and safety dimensions as well as their overall perception of the health and safety management system on the risk of sickness absence and early retirement intentions **(Chapter Six)**.

5) To investigate whether any observed associations between work factors and sickness absence are explained by other work and non-work factors **(Chapter Six)**.

6) To determine the influence of various durations of self-reported sickness absence on the risk of early retirement intentions **(Chapter Six)**.

3.3 Research Hypotheses

Hypotheses relating to four out of six objectives (objectives one, two, four and six) are discussed below.

Objective One

As discussed in the second systematic review in Chapter Two, 14 out of the 21 relevant studies investigated the relationship between sickness absence and disability retirement using the number of days of sickness absence measure and these studies generally found sickness absence to be a predictor of disability retirement. Therefore, in this sample of the police force it is hypothesised that:

Number of sickness absence spells and number of days of sickness absence can be used to predict disability retirement (H_1)

On the other hand, six out of the 14 studies that used the number of days of sickness absence measure showed that sickness absence lasting more than four weeks predicts disability retirement and therefore, it is hypothesis that:

Sickness absence spells of more than four weeks has the strongest influence on disability retirement (H_2).

Objective Two:

As most of the previous studies have generally indicated that sickness absence predicts disability retirement using the number of days of sickness absence measure, but only one out of the two studies (Kivimaki et al., 2004) that used number of sickness absence spells found this measure to be a predictor of disability retirement, it is hypothesised that:

The number of days of sickness absence has stronger influence on disability retirement than the number of sickness absence spells (H_3).

Objective Four:

Police work is intrinsically hazardous and officers are exposed to psychologically stressing and dangerous tasks more than other occupations. Police organisations are continuously challenged to meet health and safety commitments. Officers also may tend to take sick leave as a coping strategy to deal with stress and are more likely to have early retirement thoughts. Thus, it is hypothesised that:

Psychosocial, physical and employees' perception of health and safety management system predict sickness absence in the Abu Dhabi Police after taking into account the influence of age, gender and other covariates (H_4).

Psychosocial, physical and employees' perception of health and safety management system predict early retirement intention in the Abu Dhabi Police after taking into account the influence of age, gender and other covariates (H_5).

Objective Six:

The relationship between sickness absence and early retirement intention has rarely been investigated in the literature. Heponiemi et al. (2008) showed a significant increase in the risk of early retirement intention by 28% in individuals reporting sickness absence in the last 12 months (compared with those not reporting sickness absence). Thus, it is hypothesised that:

Employees reporting sickness absence within the last 12 months have an increased risk of early retirement intention compared with their counterparts who reported no sickness absence, with/without taking into account the influence of age, gender and other covariates (H_6).

3.4 The three main phases of the PhD thesis

In order to achieve the aims and objectives, the research was conducted in three main phases as described in Box 3.1. The three phases of the PhD study included an evaluation of sickness absence records; disability or ill-health retirement data; and an occupational health survey.

Box 3.1: Main research phases

1) ***Phase I***: This was a matched case control study in which the sickness absence records for all Abu Dhabi police employees who retired between 2010 and 2012 due to disability retirement were evaluated retrospectively and compared with the sickness records for employees (actively working) who were in the same department, gender and age categories (case-control design).

2) ***Phase II***: The validity and reliability of the Arabic JCQ was examined in this stage. This included the four pre-pilot procedures, namely, forward translation, backward translation, cognitive interviews and review of the questionnaire from an Arabic language expert. This was followed by psychometric validation of the Arabic JCQ using pilot study data (distributed to 108 police employees) and main survey data.

3) ***Phase III***: The occupational health and safety survey was posted to the remaining employees of the Abu Dhabi Capital Police Directorate (1, 317 employees). The survey had two main outcomes; sickness absence and early retirement intentions. It also included work (psychosocial (the Arabic JCQ), nine physical factors, seven health and safety dimensions and other work factors) and non-work factors (demographic factors, social life factors, health and lifestyle factors).

Chapter 4: The case-control study

4.1 Introduction

Avoiding disability retirement has become a great public health concern for many countries worldwide. This is because of the negative effect it has on the quality of life of those granted disability retirement and their families (Borg et al., 2001; Eden, 1999) as well as the extensive utilization of healthcare resources irrespective of causes of morbidity (Wallman et al., 2004).

The systematic literature review of previous studies presented in Chapter Two showed that sickness absence (using various measures) is a predictor of future disability retirement. These measures include the number of days of sickness absence (Borg et al., 2001; Kivimaki et al., 2004; Gjesdal et al., 2004; Gjesdal & Bratberg, 2003) average length of sickness absence spells (Borg et al., 2001; Wallman et al., 2009) and sickness absence due to certain diseases such as mental illness (Gjesdal & Bratberg, 2003; Kivimaki et al., 2007), rheumatoid arthritis and fibromyalgia (Gjesdal et al., 2004 & 2009). The results with respect to number of spells of sickness absence and disability retirement were mixed: Borg et al. (2001) did not find an association while Kivimaki et al. (2004) found it to be predictive, in particular for individuals with long term sickness absence spell (classified in this study as ≥4 days).

Findings from previous studies that investigated the relationship between sickness absence and disability retirement are limited for four main reasons. First, most of the previous studies may lack generalizability as they were conducted in Scandinavian countries where the labour market has low wage inequality, generous social insurance schemes and high employment rate (Andersen, 2011). Secondly, despite the high number of reported sickness absences, occupational injuries and early retirement in the police force (Houser et al., 2004; Arnott &

Emerson, 2001; Summerfield et al., 2011; NLEOMF, 2014), none of the previous studies investigated the relationship between sickness absence and disability retirement in this occupational group.

Thirdly, only two studies were conducted on the use of the number of sickness absence spells (Borg et al., 2001; Kivimaki et al., 2004) or average length of sickness absence spells (Borg et al., 2001; Wallman et al., 2009) as a risk marker for future disability retirement. Therefore, more research needs to be carried out to provide further insights into these relationships. Fourthly, only one previous study by Kivimaki et al. (2004) evaluated the association between the number of days of sickness absence and the risk of disability retirement adjusted for the number of spells of sickness absence and vice versa.

This study aims to evaluate sickness absence as a predictor of disability retirement using various measures of sickness absence including the number of spells of sickness absence, the total number of days of sickness absence and the average length of sickness absence spells. This study is the first to investigate this relationship utilizing data from the police force. The study also aims to determine which measure of sickness absence is the strongest marker for disability retirement.

4.2 Methods

Although a cohort design is more suitable for this type of investigation, it could not be adopted for two main reasons. First, that design may have provided indications about the general demographic characteristics of the entire Abu Dhabi Police force, which are considered to be ‘sensitive’. Secondly, sickness absence recording only commenced in 2010 and the primary outcome ‘disability retirement’ in this study was rare (an average of 26 disability retirement cases per year between 2010 and 2012 from a total of 35,000

employees). Thus, a case control design was regarded as the most feasible design to implement in the short time available, as pointed out by Hennekens & Buring, (1987) and Hennesy et al. (1999). Controls were matched with cases according to age and gender from those who worked in the same Administration as the case at baseline, to reduce the possible confounding influence of these variables.

4.2.1 Study Variables

In this study, there is one main dependent variable, disability retirement, and two main sets of explanatory variables; demographic and sickness absence measures.

Disability retirement

The primary outcome for this part of the research is retirement due to disability or ill-health. In the Abu Dhabi Police, the request for disability retirement is made by the employee, a medical doctor or an employee's department. The application is received by the Abu Dhabi Police Medical Committee, which comprises medical professionals, representatives from the Financial Directorate, the Legal Affairs Administration and the Minister's Office.

The committee meets every month and evaluates applications after a thorough examination of employees' medical files and work performance. Each employee has the right to appeal through the Abu Dhabi Police Legal Affairs Administration, whether the request is accepted or rejected. If medical retirement is granted, it is considered effective immediately.

All cases of ill health retirement in the Abu Dhabi Police between 2010 and 2012 were obtained from the Human Resources Directorate. There were 78 cases of disability retirement between 2010 and 2012, representing 31, 20 and 27 cases for 2010, 2011 and 2012, respectively. The age (categorized into 19-24, 25-29, 30-34… and 60+) and gender of each case at baseline (two years prior to retirement for each case) were then used to search for

eligible controls who worked in the same Administration as the case at baseline, using the electronic human resource system of the Abu Dhabi Police. When controls could not be found using these criteria, the search was expanded to look for controls within the General Directorate where the case was working at baseline. This was performed for only one of the cases of disability retirement. Figure 4.1 illustrates the administrative structure of the Abu Dhabi Police.

In order to have a similar number of controls for each case and maintain power, it was decided that sickness absence records for five randomly selected controls (using an electronic system) per case would be selected (for those cases with six or more controls), as recommended by Rothman (2008), Hennekens and Buring (1987) and Hennesy et al. (1999). Sickness absence records for each set of case and matched controls for one and two years before retirement were then obtained from the system. The final records included 75 sets of cases and controls (31, 20 and 24 disability retirement cases in 2010, 2011 and 2012 respectively); three cases were excluded because they started working for the police in 2012 and were granted disability retirement in the same year (due to involvement in major accidents). There were 344 controls, an average of 4.5 controls per case. The data collection procedure is described in Figure 4.2.

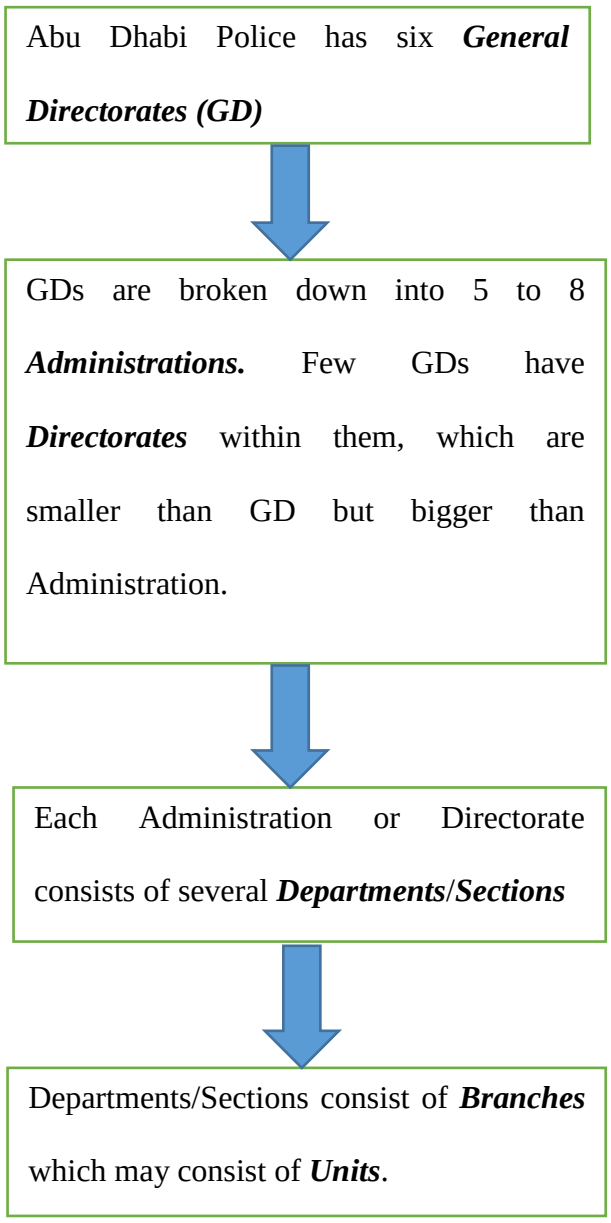

Figure 4.1 The administrative structure of the Abu Dhabi Police

Demographic variables

In addition to the matching variables, the following demographic variables were extracted from Human Resources (HR) records: marital status, educational level, occupation, employment type (civilian/officer), employment grade, and years of service. Table 4.1 describes the coding used for each category of demographic variable. Employment grade from HR records was grouped by the researcher into administrative/supportive staff, field and non-field police employees. Admin/supportive staff include correspondents, equipment technicians, typists, translators and medical staff at the police hospital. Field police officers include armed officers, investigators, crime scene officers, inspectors and police car drivers whereas non-field officers include crime telephone operators, admin officers, weapon store employees and prison guards.

Sickness records

Abu Dhabi Police implements a rigid system of recording of sickness absence whereby all spells of sickness, regardless of duration, are recorded in the Human Resource System**.** Figure 4.3 shows the procedures for registering sickness absence in Abu Dhabi Police. For each spell of sickness absence, details recorded include date of absence and duration of spell in days. This information was used to compute the total number of spells and overall duration in the year and total sickness absence throughout the years of service.

For each record, sickness absence was classified as long term if number of days of sickness absence (or duration) was four weeks or more, as recommended by the National Institute of Health and Care Excellence (NICE) in England (Gabbay et al., 2010). As a "fit to work note" is commonly required for spells lasting 8 days or more (Black and Frost, 2011), a further category for spells between 8 days and 4 weeks (defined as 28 days) was introduced in this

study. In order to compare results from this thesis with the existing literature, two more categories of sickness absence spells were added namely, 1-3 days and 4-7 days. Thus, categories of sickness absence spells used in the study are 1-3d, 4-7d, 8-28d and spells lasting more than four weeks (>4weeks).

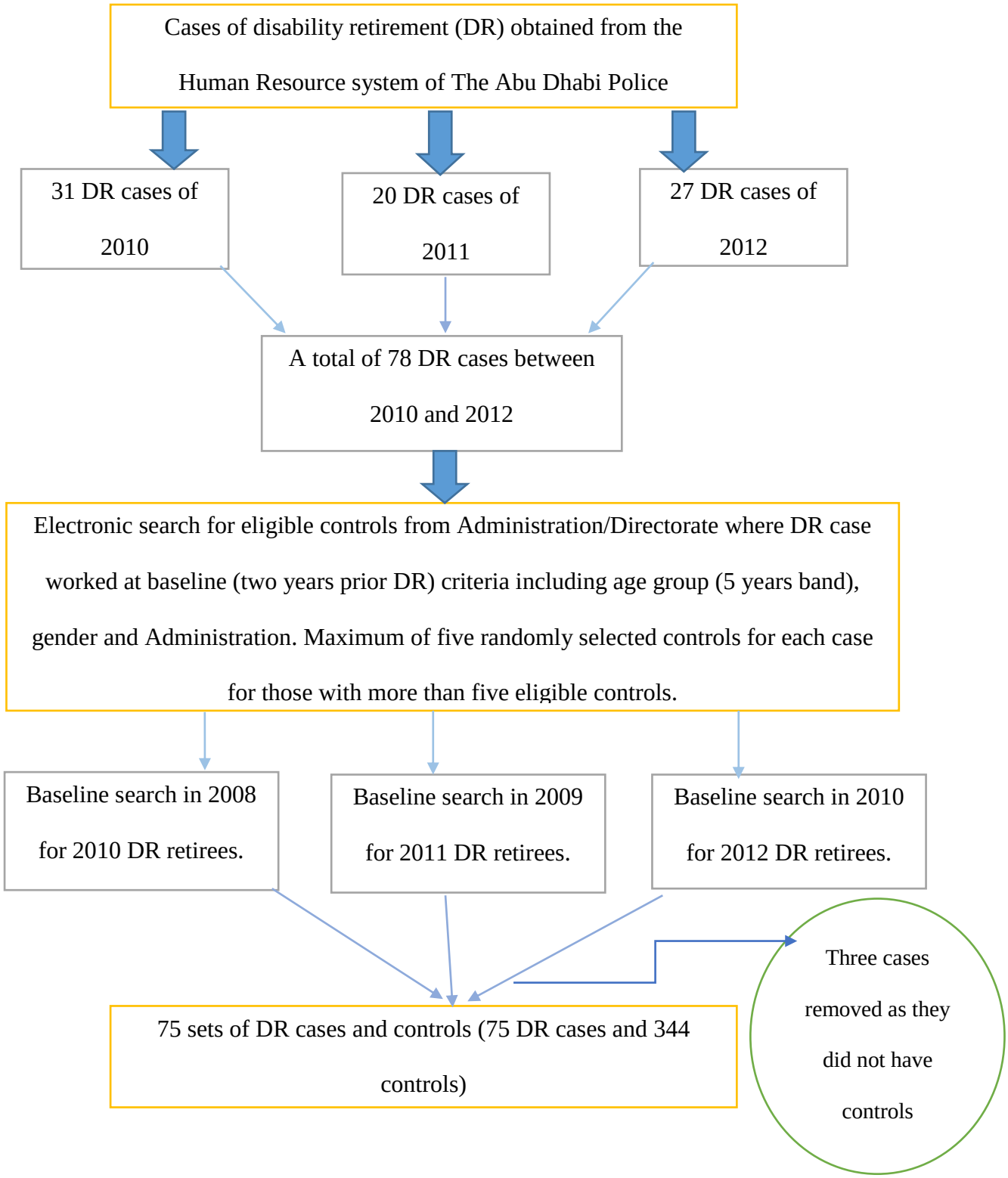

Figure 4.2 Data collection procedure for disability retirement (DDR) cases and their controls using the electronic Human Resource System of the Abu Dhabi Police.

For any spell that overlapped between one calendar year and the next, such as baseline (two years before retirement), to follow up (one year before retirement), the spell was counted in the year that it started but the overlapping sickness absence days were added to the following year. For example, if a case had a spell of 10 days duration starting on December 31st of 2010, the spell was counted in the total number of spells for 2010 records but only one of its days was included in the duration for 2010 and the remaining 9 days in that spell were added to the duration for 2011. This concurs with procedures previously implemented in the Whitehall II study (Head, J. (2013) Personal communication 15th Sep 2013). From these records, the variables calculated for each case and control are described in Box 4.1.

Box 4.1: Sickness absence variables calculated for each case and control

1) Total number of spells of sickness absence for each year and for the total exposure period.
2) Total number of days of sickness absence for each year and for the total exposure period.
3) Average length of sickness absence spells absence (or number of days of sickness absence per spell) for each year (and duration of spell) and for the total exposure period.
4) Total number of spells of sickness absence for each type of sickness spell (1-3d, 4-7d, 8-28d and >4weeks) for each year and for the total exposure period.
5) Total number of days of sickness absence for each type of sickness spell for each year and for the total exposure period.

4.2.2 Statistical methods

Each set of one case and one or more matched controls was given a unique identifier (ID). All the records were then transferred into STATA 12 for analytical purposes. Descriptive statistics using counts and percentages were used for demographic variables and means and standard deviations were used to describe number of days of sickness absence and number of sickness absence spells. The mean number of sickness absence spells (Table 4.4) for controls were obtained by calculating the mean for the controls in each case/control set (resulting in 75 control means). The mean of the means for controls was then calculated. This was done to reduce bias in reporting of estimates as cases did not have same number of controls.

Since the disability retirement outcome is binary and the study design is a matched case control study, the effects of each exposure and covariate on the risk of disability retirement were estimated using odds ratios and 95% confidence intervals calculated from fitting conditional logistic regression models as recommended by Rose and Laan (2009) and Essebag et al. (2005) using the matched set ID as the matching indicator for the analyses. A significance test for each exposure and covariate was calculated using a likelihood ratio test and the resulting p value is reported. Prior to fitting the conditional logistic regression models, the number of days of sickness absence for cases and controls were divided by 10 so that the resulting odds ratios are based on each additional 10 days of sickness absence (Table 4.6).

When evaluating the effect of the average length of sickness absence spells on disability retirement an additional variable was created and added to the model. The variable was required so that the effect of average number of days was assessed only from information

from participants who had one or more sickness absence spell. The variable was coded as 0= those with no sickness absence spells and 1= with sickness absence spells (Tables 4.6).

For each sickness absence measure, conditional logistic regression models were fitted first by adjusting for age, gender and work Administration only (the baseline matching criteria), and then adjusting additionally for demographic variables (Table 4.8). Finally, adjustment for the corresponding sickness absence measure was also evaluated, shown in Table 4.9 (adjusting for the total number of days when examining risk of sickness absence spell on disability retirement and vice versa).

Table 4.1 Categorisation of demographic variables and coding used for data analysis

Variable	Options obtained from the Abu Dhabi Police HR system	Category and coding used in data analysis
Marital status	Married, single, divorced and widowed/widower	Married=1 Not married=2
Occupation	A wide range of occupations within the police force	Admin/Supportive staff=1 Field Policing=2 Non-Field Policing=3
Grade	From Policeman (low) to Lieutenant Colonel for officer (high). Records did not include cases or controls with higher ranks than the latter. From Grade 17 (low) to Grade 1 (high) for civilians.	'Low'= Policeman to Corporal and Civilian Grade 8 or above (code=1) 'Medium'= Sergeant to Warrant officer and Civilian Grade 7-5 (code=2) 'High 2'= First Warrant Officer to Captain and Grade 3 and 4 for civilians (code =3) 'High 1'= Major and above and Grade 2 and below for civilian (code =4) (Note: there were only a small number of cases and controls in 'High 1' category and therefore, this category was combined with 'High 2' in the analysis)
Employment type	Either Civilian or Officer	Civilian=1 Officer=2
Education	Categories are No Qualifications, Reads and writes with no qualifications, School education from Grade 1 to Grade 12, After school professional certificates, Diploma, Bachelor's and Master's degrees.	Certificate and diploma or above (High 1) =1 High school (High 2) =2 Grade 7-11 (Medium) = 3 Grade 1-6 (Low) = 4 No Qualification but reads and writes (No qualification) =5 (Note. Because only a small number were in High 1, this category was combined with High 2 in the analysis)

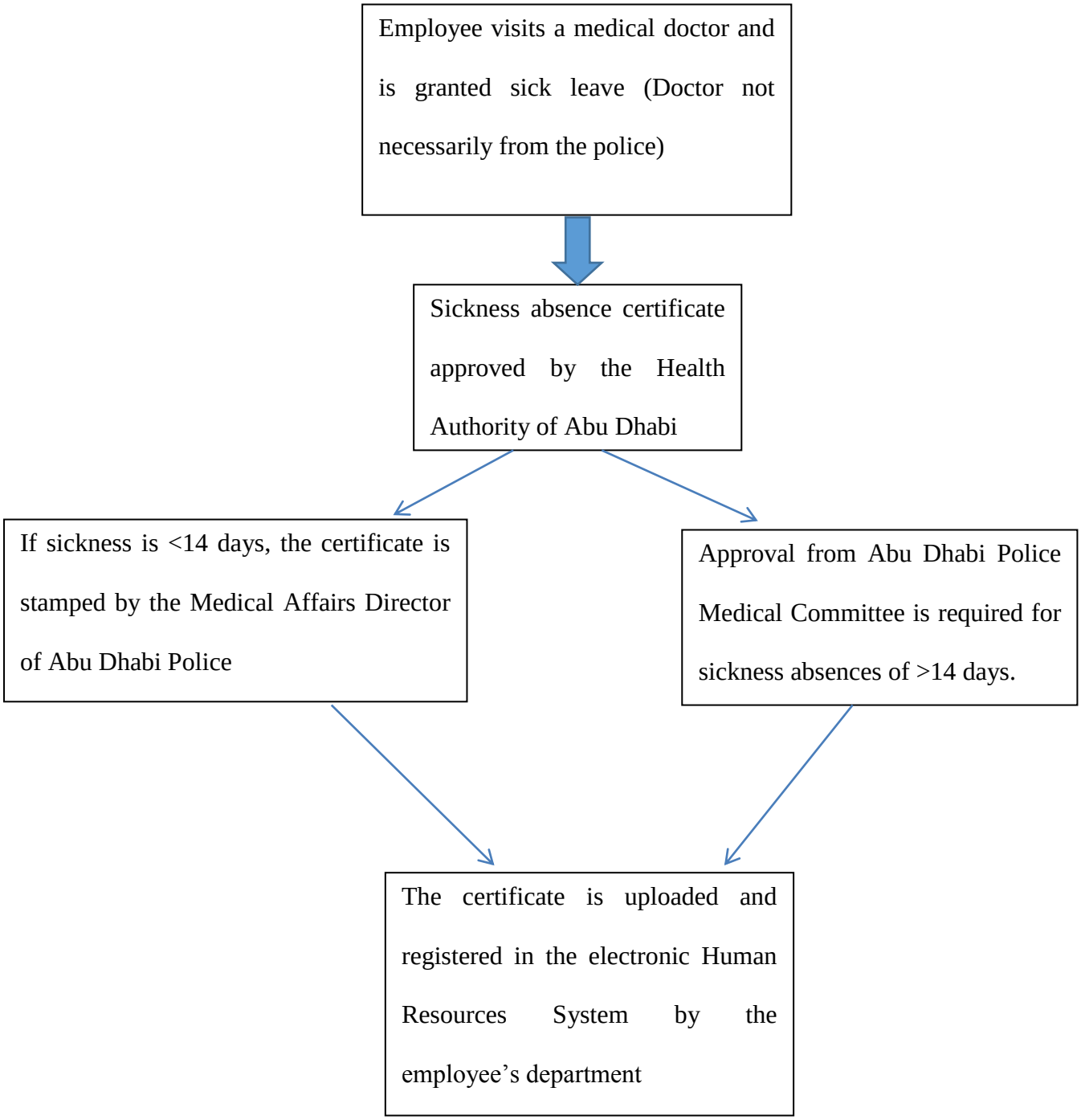

Figure 4.3 Procedures for registering sickness absence in the Abu Dhabi Police

4.3 Results

4.3.1 Demographic characteristics

Table 4.2 describes the demographic characteristics of the cases and controls at the penultimate calendar year of the exposure period (baseline). Approximately, two thirds of the sample were aged 18-39 years and only one-fifth of the cases and controls were female. Cases were less likely to be married (59%) compared with controls (76% married).

In the cases and controls, 47% and 61% respectively were categorized as ‘field policing’ and the majority (75% (56/75) and 83% (287/344) respectively) were police officers. A balanced representation across employment grades was seen in the control group while 49% of cases were in ‘medium’ employment grades and 16% in the ‘high’ employment grade category. Regarding education, 35% and 50% of cases and controls respectively had Grade 12 (high school certificate) or above while 27% and 22% respectively had either ‘low’ or ‘no qualification’.

Table 4.2 Demographic characteristics of the sample and their associations with disability retirement

Variable	Total Sample (n=419)				Odds ratio[1] for disability retirement			
	Cases (n=75)		*Controls (n=344)*		OR	95% CI	*P* value for heterogeneity[2]	*P*[3]
	N	%	N	%				
Age[4]								
18-29	24	32.0	107	31.1				
30-39	22	29.3	119[#]	34.6				
40-49	14	22.7	81[#]	23.6				
50-59	11	14.7	34	9.9				
60+	1	1.3	3	0.9				
Gender[4]								
Female	16	21.3	66	19.2				
Male	59	78.7	278	80.8				
Marital Status								
Married	44	58.7	263	76.4	1			
Non-Married	31	41.3	81	23.6	**2.93**	**1.55-5.56**	0.001	<0.001
Occupation								
Admin/ supportive	23	30.7	57	16.6	1			
Field Policing	35	46.7	210	61.1	**0.28**	**0.13-0.61**	0.01	0.001
Non-Field Policing	17	22.7	77	22.4	**0.43**	**0.19-0.96**		0.04
Grade								
High (3+)	12	16.0	104	30.2	1			
Medium (2)	37	49.3	135	39.2	2.39	1.18-4.84	0.04	0.02
Low (1)	26	34.7	105	30.5	2.00	0.96-4.41		0.09
Employment Type								
Civilian	19	25.3	57	16.6	1			
Officer	56	74.7	287	83.4	0.57	0.27-1.18	0.14	0.13
Education								
High 1 &High 2	26	34.7	172	50.0	1			
Medium	29	38.7	96	27.9	**2.13**	**1.15-3.96**	0.05	0.02
Low & No qualification	20	26.6	76	22.0	1.77	0.81-3.66		0.15

[1] Odds ratios are adjusted for the matching variables (age, sex and work Administration) [2] Heterogeneity across all categories is based on the likelihood ratio test [3] p value in comparison with reference group based on the Wald test [4] Matching variable [#] Discrepancies in number of controls per case (exceeding 5 controls per case) because matching on years of age rather than exact date of birth.

4.3.2 Sickness absence spells

It can be seen from Table 4.3 that 44% of the cases (33/75) had 11 or more spells during the two year exposure period compared with only 10% of controls (34/344). One third of cases (26/75) had between 1 and 7 spells whereas two thirds of controls (230/344) had sickness absence spells within this range. Appendix Tables A 4.1-4.4 show the distribution of the number of spells over the two year exposure period in cases and controls for each type of sickness absence spell.

Tables A 4.5-4.6 respectively show the distribution of the total number of spells over the two year exposure period in cases and controls, separately by gender and age groups. Female cases and cases aged between 18 and 29 had the highest percentage of 11 spells or more (12/16 females and 15/24 of those aged 18-29).

There was a balanced representation between controls in different age groups with respect to the total number of sickness absence spells over the two year exposure period. More than two thirds of male controls (179/278) had between 0 and 3 sickness absence spells compared with around one third of female controls (25/66).

Table 4.3 Distribution of number of spells of sickness absence for cases and controls over the two year exposure period

Number of spells	Cases		Controls	
	N	*(%)*	*N*	*(%)*
0	7	9.3	61	17.7
1-3 spells	15	20.0	161	46.8
4-7 spells	11	14.7	69	20.0
8-10 spells	9	12.0	19	5.5
11-20 spells	17	22.7	30	8.7
21+ spells	16	21.3	4	1.1
Total	75		344	

The mean number of spells of sickness absence for disability retirement cases was 10.7, more than double that of the controls (mean= 4.2 spells) for all spells combined. The same was seen for each type of spell longer than 4 days but not for spells lasting 1-3 days (Table 4.4).

4.3.3 Number of days of sickness absence

Table 4.5 shows the distribution of the number of days of sickness absence in cases and controls over the two year exposure period. Approximately one third of the disability retirement cases had less than 40d of sickness absence and a similar percentage had 160d or more of sickness absence over the two year exposure period. Most of the controls (90%) on the other hand, had either zero days of sickness absence (18%) or between 1d and 39d of sickness absence (72%) during the exposure period. The distribution of the durations of days of sickness absence from the four types of spells over the exposure period in cases and controls are shown in Appendix Tables A 4.7-4.1.

The distribution of the total number of days of sickness absence in cases and controls, separately by gender and age groups over the exposure period are shown in Tables A 4.11-4.12 respectively. Half of female cases and cases aged between 18 and 29 had 160d or more of sickness absence over the two year exposure period. There was a balanced representation in the number of controls in all age categories with respect to the various categories of number of days of sickness absence over the exposure period, with the majority of controls having less than 40d of sickness absence (310/344). 77% of female controls (52/66) compared with 92% male controls (259/278) had less than 40d of sickness absence over the two year exposure period.

Table 4.4 Number of sickness absence spells prior to retirement, overall and by duration of spell in cases and controls and odds ratio for disability retirement.

Type and period of spell	Total sample (n=419)				Odds ratio[1] for disability retirement		
	Cases (n=75)		*Controls (n=344)*				
	Mean	SD	Mean	SD	OR[2]	95% CI	*P*[3]
Total number of all spells							
Penultimate calendar year	4.1	0.5	2.3	0.2	**1.17**	**1.09-1.27**	***<0.001***
Final calendar year	6.5	0.7	1.9	0.3	**1.31**	**1.21-1.41**	***<0.001***
Total exposure period	10.7	1.0	4.2	0.4	**1.18**	**1.13-1.25**	***<0.001***
No. of spells of 1-3d							
Penultimate calendar year	1.9	0.3	1.8	0.2	1.03	0.93-1.14	0.55
Final calendar year	2.7	0.4	1.5	0.2	**1.13**	**1.05-1.23**	***<0.01***
Total exposure period	4.6	0.6	3.3	0.4	**1.06**	**1.01-1.12**	***0.02***
No. of spells of 4-7d							
Penultimate calendar year	0.7	0.1	0.2	0.4	**1.85**	**1.34-2.56**	***<0.001***
Final calendar year	1.0	0.2	0.2	0.04	**2.08**	**1.52-2.84**	***<0.001***
Total exposure period	1.6	0.3	0.4	0.1	**1.76**	**1.42-2.20**	***<0.001***
No. of spells of 8-28d							
Penultimate calendar year	0.6	0.2	0.2	0.04	**1.59**	**1.19-2.12**	***<0.01***
Final calendar year	1.4	0.2	0.1	0.04	**3.22**	**2.06-5.02**	***<0.001***
Total exposure period	2.0	0.3	0.4	0.1	**1.96**	**1.54-2.49**	***<0.001***
No. of spells >4weeks							
Penultimate calendar year	0.9	0.2	0.1	0.4	**3.36**	**2.08-5.41**	***<0.001***
Final calendar year	1.5	0.2	0.1	0.1	**3.56**	**2.24-5.67**	***<0.001***
Total exposure period	2.2	0.4	0.3	0.1	**2.47**	**1.79-3.40**	***<0.001***

[1] Odds ratios are adjusted for the matching variables (age, sex and work Administration) [2] Odds ratio of disability retirement associated with each additional spell of sickness absence. [3] p value based on likelihood ratio test.

Table 4.5 Frequency distribution of total number of days of sickness absence for cases and controls over the two year exposure period.

Total number of days of sickness absence	Cases (n=75)		Controls (n=344)	
	N	*(%)*	*N*	*(%)*
0	7	9.3	61	17.7
1-39	19	25.3	249	72.4
40-79	9	12.0	18	5.2
80-119	7	9.3	4	1.2
120-169	6	8.0	1	0.3
160-199	7	9.3	1	0.3
200+	20	26.7	10	2.91
All durations	75		344	

Table 4.6 shows the mean number of days of sickness absence for all spells and the average length of sickness absence spells in cases and controls at each calendar year prior to disability retirement. Cases had an average of 166d of sickness absence throughout the exposure period compared with 28d for controls. Over the two year exposure period, disability retirement cases also had nearly a three times higher average length of sickness absence spells (20d) than their counterpart controls (7d). The average length of sickness absence spells for cases was higher in the final calendar year (22d) than the penultimate calendar year (18d).

Table 4.6 Total number of days of sickness absence and average length of sickness absence spells over the two year exposure period prior to retirement, in cases and controls and odds ratios for disability retirement

Variable relating to number of days of sickness absence	Total sample (n=419)				Odds ratio[1] for disability retirement		
	Cases (n=75)		*Controls (n=344)*				
	Mean	SD	Mean	SD	OR[2]	95% CI	*P*[3]
Total number of days of sickness absence for all spells							
Penultimate calendar year	62.9	11.05	14.3	2.4	**1.17**	**1.10-1.25**	***<0.001***
Final calendar year	103.2	10.0	13.2	5.0	**1.32**	**1.21-1.45**	***<0.001***
Total exposure period	166.4	21.9	27.5	7.0	**1.17**	**1.11-1.23**	***<0.001***
Average length of sickness absence spells							
Penultimate calendar year	17.9	3.1	6.9	1.2	**1.34**	**1.13-1.60**	***<0.01***
Final calendar year	21.9	5.4	5.9	1.0	**2.05**	**1.51-2.77**	***<0.001***
Total exposure period	19.9	3.5	6.9	1.0	**1.44**	**1.19-1.73**	***<0.001***

[1] Odds ratios are adjusted for the matching variables (age, sex and work Administration) [2] OR and CI based on each additional 10 days of sickness absence

[3] p value based on likelihood ratio test

4.3.4 Differences in risk of disability retirement

Demographic variables

The right hand side of Table 4.2 shows the odds ratios for the association between demographic variables and disability retirement, estimated using conditional logistic regression. There was a statistically significant increase in the odds of disability retirement of more than two fold both in employees with medium, compared with high, employment grade and those with medium, compared with high, education levels. Increased odds of disability retirement were also seen in individuals with low, compared with high, employment grades (OR=2.0, 95% CI=0.96-4.41) and employees with low or no qualification compared with those with Grade 12 of education or above (OR=1.77, 95% CI=0.81-3.66) although these increases were statistically non-significant.

When compared with their married counterparts, non-married police employees had a statistically significant increase in odds of disability retirement of almost three fold (OR=2.93, 95% CI=1.55-5.56). Non-field and field police officers, on the other hand, had significantly reduced odds of disability retirement compared with admin/supportive staff (OR=0.43 and 0.28 with 95% CI=0.19-0.96 and 0.13-0.61 respectively). Compared with civilian workers, officers had a lower odds of disability retirement, although this was not statistically significant (OR=0.57, 95% CI=0.27-1.18).

Sickness absence spells

Total number of sickness absence spells at baseline (OR=1.17), final year (OR=1.31) and total exposure period (OR=1.18) was a statistically significant predictor of disability retirement. Apart from the number of spells of 1-3d in the penultimate calendar year, all other

spell durations at each year of the exposure period significantly increased the odds of subsequent disability retirement (Table 4.4).

From Table 4.4, conditional logistic regression results indicate that odds ratios for disability retirement for the total exposure period increased from 1.76 (95% CI=1.42-2.20) for spells of 4-7d to 2.47 (95%CI= 1.79-3.40) for spells of >4 weeks. Number of spells of sickness absence lasting >4weeks also resulted in the highest odds of disability retirement than other types of spells in the penultimate calendar year (OR=3.36, 95% CI=2.08-5.41) and in the final year prior to disability retirement (OR=3.56, 95% CI=2.24-5.67) and during the whole exposure period (OR=2.47, 95%CI=1.79-3.40).

Number of days of sickness absence

The odds of disability retirement for all sickness absence spells and for the average length of sickness absence spells are shown in Table 4.6. There were statistically significant increases in the odds of disability retirement at baseline (OR=1.17), final year (OR=1.32) and total exposure period (OR=1.17).

As the number of days of sickness absence is expressed per 10 days of sick leave, this could be expressed as "after adjusting for matching variables (age, sex and work Administration), for each 10 additional days of sickness absence in the penultimate and final year prior to disability retirement, the odds of disability retirement increased by 17% and 32% respectively". Finally, the results of Table 4.6 also showed that the average length of sickness absence spells during the exposure years was a significant predictor of disability retirement ((OR=1.34, 95% CI=1.13-1.60) for the penultimate calendar year, (OR=2.05, 95%CI= 1.51-2.77) for the final year and (OR=1.44, 95%CI= 1.19-1.73) for the entire exposure period).

Sickness absence indicators and the risk of disability retirement

Table 4.7 compares the odds ratios of disability retirement at end of the exposure period adjusted for the matching variables and the chi-squared value for association for the total number of days of sickness absence, the total number of spells of sickness absence and for the average length of sickness absence spells. The strongest association, based on the chi-squared values, was seen for the total number of sickness absence spells followed by the total number of days of sickness absence. The degree of association of disability retirement with the average length of sickness absence spells was less than for the other two measures.

Table 4.7 Odds ratio (95% CI) of disability retirement and chi-squared value for test of association for total number of spells of sickness absence, the total number of days of sickness absence and the average length of sickness absence at end of exposure period at baseline

Sickness absence measure	Odds ratio[1] for disability retirement	Chi-squared
Number of sickness absence spells[2]	**1.18 (1.13-1.25)**	41.3
Number of days of sickness absence[3]	**1.17 (1.11-1.23)**	36.0
Average length of sickness absence spells[3]	**1.44 (1.19-1.73)**	14.6

[1]Odds ratios are adjusted for the matching variables (age, sex and work Administration) [2]OR and CI based on each additional sickness absence spell [3] OR and CI based on each additional 10 days of sickness absence.

Adjustment model

Table 4.8 compares the odds ratios of disability retirement at end of the exposure period adjusted for the matching variables with those obtained after additionally adjusting for all demographic variables (model b), namely, marital status, occupation, employment grade and type, and educational level. The odds ratios of disability retirement remained significantly raised for the total number of days of sickness absence and for the number of spells of sickness absence for all spell types, apart from spells lasting 1-3 days where the odds ratios became non-significant.

Odds ratios of disability retirement for the total number of spells and the total number of days of sickness absence at end of the exposure period were also evaluated using two additional models (Table 4.9). After adjusting for matching variables and the corresponding sickness absence measure (adjusting for total number of days of sickness absence when evaluating relationship between total number of spells and disability retirement), the odds ratio of disability retirement for the total number of days of sickness absence and the total number of spells of sickness absence remained statistically significant but decreased by 31% and 58% respectively. However, in the fully adjusted model, which included the latter model and adjusting additionally for other demographic variables, the odds ratio of disability retirement remained statistically significant only for the total number of days of sickness absence.

Table 4.8 Odds ratio (95% CI) of disability retirement for total number of days and total number of spells of sickness absence (all spells and for each spell duration) at end of exposure period at baseline and after adjusting for other demographic variables.

Total number of days of sickness absence/total number of sickness absence spell	Model (a) OR (95% CI)	Model (b) OR (95% CI)
Total number of days of sickness absence[1]	**1.17 (1.11-1.23)**	**1.16 (1.10-1.23)**
Total number of spells of sickness absence	**1.18 (1.13-1.25)**	**1.17 (1.10-1.23)**
Number of spells lasting 1-3d	**1.06 (1.01-1.12)**	1.02 (0.96-1.08)
Number of spells lasting 4-7d	**1.76 (1.42-2.20)**	**1.77 (1.39-2.27)**
Number of spells lasting 8-28d	**1.96 (1.54-2.49)**	**1.95 (1.52-2.51)**
Number of spells >4weeks	**2.47 (1.79-3.40)**	**2.33 (1.67-3.24)**

Model (a) at baseline adjusted for the matching variables (age, sex and work Administration)

Model (b) is adjusted for the matching variables and for all demographic variables

[1] OR and CI for days of sickness absence are for each additional 10 days of sickness absence.

Table 4.9 Odds ratio (95% CI) of disability retirement for total number of days and total number of spells of sickness absence at end of exposure period using four different statistical testing models.

Total number of days of sickness absence/total number of sickness absence spell	OR (a)	OR (b)	OR (c)	OR (d) *fully adjusted*
Total number of days of sickness absence[1]	**1.17 (1.11-1.23)**	**1.16 (1.10-1.23)**	**1.12 (1.06-1.19)**	**1.13 (1.07-1.20)**
Total number of spells of sickness absence	**1.18 (1.13-1.25)**	**1.17 (1.10-1.23)**	**1.08 (1.01-1.15)**	1.06 (0.99-1.14)

(a) Adjusted for the matching variables (age, sex and work Administration)

(b) Model (a) and adjustment for demographic variables

(c) Model (a) and adjustment for the corresponding spell/days of sickness absence

(d) Adjusting for b + c

[1]OR and CI for days of sickness absence are for each additional 10 days of sickness absence

Summary of findings

This study evaluated the relationship between sickness absence and disability retirement using a matched case-control study design. The study included 75 sets of disability retirement cases (75 cases and 344 controls) who retired between 2010 and 2012. Controls were selected using disability retirement cases details including age, gender and administration in which the disability retirement case at baseline (two years prior to retirement of the case). Sickness absence records for two consecutive years were then obtained from the electronic register starting from baseline year.

The relationship between sickness absence and the risk of disability retirement was evaluated using conditional logistic regressions. Three sickness absence measures were used which are the number of sickness absence spells, the number of days of sickness absence and the average length of sickness absence spells. Disability retirement cases had a mean number of spells of sickness absence of 10.7 compared with 4.2 mean spells for controls. During the two year exposure period, 44% of cases had 11 spells or more compared with only 10% of controls. One third of disability retirement cases had 160d or more of sickness absence during the two year exposure period while most of controls had 39 days of sickness absence or less during the two year exposure period.

The total number of sickness absence spells was a significant predictor of disability retirement. Conditional logistic regression results indicated a gradual increase in the risk of disability retirement with the increase in the range of sickness absence spells. The total number of days of sickness absence and the average length of sickness absence spells at baseline, final year and total exposure period were also significant predictors of disability retirement.

The odds ratio of disability retirement at the end of the exposure period for each of the three sickness absence measures were compared using chi-squared values. The strongest association was seen for the total number of sickness absence spells followed by the total number of days of sickness absence and the average length of sickness absence spells.

Finally, the association between the total number of sickness absence spells and the total number of days of sickness absence for the two years exposure period and the risk of disability retirement was then evaluated by adjusting additionally for demographic and corresponding sickness absence measure. The associations remained statistically significant when demographic variables or corresponding sickness absence measure were added. However, in the fully adjusted model (adjusting for baseline variables, demographic and corresponding sickness absence measure), the total number of days of sickness absence remained a significant predictor of disability retirement while the number of sickness absence spells did not.

4.4 Discussion

This study is one of very few studies that have examined the use of various sickness absence measures as risk markers for disability retirement. The average length of sickness absence spells during the penultimate and final year prior to retirement in disability retirement cases in this study was 18 and 22 days while controls had an average of 7 and 6 days (Table 4.6).

In general, the total number of sickness absence spells (regardless of spell duration) and for each spell duration (except for spells lasting 1-3 days), the total number of days of sickness absence for all spells and the average length of sickness absence spells were all significant predictors of sickness absence. Apart from spells lasting 1-3 days, the results remained statistically significant even after adjusting additionally for other demographic variables.

In the latter model, the greatest increase in risk of disability retirement was seen in relation to the total number of spells >4weeks (OR=2.33, 95% CI= 1.67-3.24) followed by spells of 8-28d (OR=1.95, 95% CI=1.52-2.51) and spells of 4-7d (OR=1.77, 95% CI=1.39-2.27). The differences in findings relating to the use of each sickness absence measures as a risk marker for disability retirement between the current study and the literature is discussed further below.

4.4.1 Total number of sickness absence spells and risk of disability retirement

As previously stated, the results of my systematic review (Chapter Two) showed that only two studies (Kivimaki et al., 2004; Borg et al., 2001) have evaluated the association between total number of sickness absence spells and risk of disability retirement. In the current study, the number of sickness absence spells for each type of spell and for all spells (regardless of spell duration) at the end of the exposure period was a statistically significant predictor of disability retirement (Table 4.6).

Kivimaki et al. (2004) found a significant increase in the risk of disability retirement in individuals with more than one long term sickness absence spell (>3d) compared with those with no such spells (HR=3.5 and 4.2 for men and women respectively) in the fully adjusted model. However, the risk of disability retirement did not increase in individuals with short term spells (1-3d). Thus, the findings of this study concur partly with that of Kivimaki et al. (2004). On the other hand, Borg et al. (2001) showed that the number of sickness absence spells is not a predictor of disability retirement. Although the latter cohort study followed participants for 11 years, the study only selected individuals with more than 28 days of sickness absence for follow up which may explain reasons for variation in findings between Borg et al.'s (2001) study and the current study.

4.4.2 Number of days of sickness absence and risk of disability retirement

In this study, the total number of days of sickness absence in the follow up period was a statistically significant predictor of disability retirement (Table 4.6). This agrees with findings from the literature which have shown statistically significant increases in the risk of disability retirement for sickness absence (compared with the reference group in each study) of more than 1d (Ahola et al., 2011), 6d (Labriola & Lund, 2007), 7d (Karlsson et al., 2008; Borg et al., 2001), 15d (Kivimaki et al., 2004), 28d (Biering-Sorensen et al., 1999), 31d (Jensen et al., 2012), 90d (Borg et al., 2004; Brun et al., 2003), 101d (Gjesdal et al., 2004) and 281d (Gjesdal & Bratberg, 2003). In addition, the risk of total number of days of sickness absence on disability retirement in this study (OR=1.17) was similar to other studies such as Wallman et al. (2009) (OR=1.16), who also used 10 days period of sick leave duration in their analysis.

4.4.3 Average length of sickness absence spells and risk of disability retirement

As with the findings of the Borg et al. (2001) and Wallman et al. (2009), our results showed a significant increase in risk of disability with the increase in the average length of sickness

absence spells (Table 4.6). However, the findings of this study with respect to the relationship between average length of sickness absence spells and risk of disability retirement can be directly compared only with Wallman et al.'s (2009) study who also investigated this relationship using 10day periods.

The latter study found a significant increase in risk of disability retirement by 10% when the average length of sickness absence spells increased by 10day periods while in this study the risk increased significantly by 44%. Wallman et al.'s (2009) study adopted a cohort design whereby participants were followed for up to 16 years while the exposure period for our case control study was only two years.

4.4.4 Adjustment models

As discussed in Chapter Two, few studies have adjusted for demographic variables when the relationship between sickness absence and disability retirement was evaluated (Lund et al., 2007; Kivimaki et al., 2004; Labriola and Lund et al., 2007; Ahola et al., 2011). The significant positive association between sickness absence and risk of disability retirement after adjusting for the matching criteria and additionally for other demographic variables seen in this study, concurs with the aforementioned studies.

However, it is difficult to compare these findings exactly due to the differences in demographic adjustments used in this study and other studies. For example, Lund et al. (2007) adjusted only for age, while Labriola and Lund et al. (2007) and Ahola et al. (2011) adjusted additionally for health behaviours, work factors and clinical factors.

Only one study evaluated the relationship between sickness absence and disability retirement by adjusting for demographic variables and other sickness absence measures (Kivimaki et al., 2004). Similar to our findings in the fully adjusted model, Kivimaki et al. (2004) found a

statistically significant in risk of disability retirement for total number of days of sickness absence (participants with >15 days of sickness absence compared with 0 days).

In the fully adjusted model of this study, the relationship between the total numbers of sickness absence spells and disability retirement was non-significant. In the study of Kivimaki et al. (2004), the total number of short sickness absence spells (1-3 days) did not significantly increase the risk of disability retirement while a significant rise in risk was seen for long term sickness absence spells (>3 days). Thus, it can be argued that the total number of days of sickness absence is a stronger predictor of sickness absence than the total number of sickness absence spells.

4.4.5 Strengths and limitations

There are many strengths of this study. First, the study matched cases to eligible controls with similar age, sex and same working Administration (at baseline). Sickness absence records were then collected by following cases and controls prospectively (from baseline until disability retirement was granted to cases). This has ensured that cases are matched with controls who had similar work exposures at the start of the study.

Secondly, although many of the previous studies utilized register-based data of sickness absence, one main strength of this study is the fact that Abu Dhabi Police implements a rigid system of recording sickness absence whereby all sickness absence spells regardless of duration are recorded in the Sickness Absence Human Resources System. This has allowed for accurate estimation of the association of short term sickness absence spells of 1-3 days with disability retirement. Thirdly, this study is one of very few to evaluate risk of disability retirement for different measures of sickness absence (Kivimaki et al., 2004; Borg et al., 2001) or average length of sickness absence spells (Borg et al., 2001; Wallman et al., 2009).

In addition, the evaluation of the sickness absence in this study was made using various measures of sickness absence, namely, number of days of sickness absence, number of spells of sickness absence and average length of sickness absence spells. This has allowed the results to be displayed for each exposure period separately and combined as well as all spells (regardless of spell duration) and for each spell duration separately. Although these three sickness absence measures predicted disability retirement, this study showed that the number of sickness absence spells and the number of days of sickness absence are equally good predictors of sickness absence while the average length of sickness absence spells had lower predictability of disability retirement than the latter two sickness absence measures.

Finally, controlling for age, gender and work Administration at baseline (during selection of controls) and additionally for other demographic variables and corresponding sickness absence measure could be considered as a strength of this study since only four of the previous studies incorporated adjustments in the analyses: Lund et al. (2007) adjusted only for age, Kivimaki et al. (2004) adjusted results for age, SES, town and other sickness absence measures, Labriola and Lund et al. (2007) and Ahola et al. (2011) adjusted additionally for health behaviours, work factors and clinical factors (not valid for Lund et al., 2007).

The current study had some limitations. After identifying cases of disability retirement, controls were selected from the Administration where the case worked at baseline (two years prior to granting of disability retirement). As cases and controls may have changed work Administration after baseline, their work exposures may differ, however, controlling for such effects was not possible. The inability to control for other potential predictors of disability retirement such as medical diagnoses and organisational and occupational job factors are other limitations for this study.

Comparing this study's findings with others was difficult due to variation in the definitions used to classify spells into short and long term sickness absence spells. For example, Jensen et al. (2012) defined long spells as more than 30 days of sick leave for upper limb disorder and 90 days or more of sickness absence for low back pain while Kivimaki et al. (2004) recognised short term spells as 1-3 days and long term as more than three days of sick leave. Finally, differences between the findings of this study and other studies could be related to variations in sickness absence policies and regulations. In the UK a "fit to work" note must be obtained for sickness absence of more than 8 days (Black and Frost, 2011) while the Abu Dhabi Police implement this procedure only for spells lasting four weeks or more.

Chapter 5: The development and validation of the Arabic Karasek's Job Content Questionnaire (JCQ)

5.1 Introduction

The Job Demand-Control model to measure work-related stress was initially formulated by Karasek (1979) and then developed both empirically and psychometrically by Karasek and Theorell in 1990. It is currently the most commonly used self-administered measure of occupational stress (Kompier, 2003; Hurrell et al, 1998). The model has two dimensions, namely, the demand dimension and the control or decision latitude dimension. The demand dimension is concerned with the complexity of work tasks (their challenges and variety of tasks), their intensity, the skills demanded and the possibility of keeping up with co-workers while the control dimension is sub-divided into factors that measure decision authority ('one's control over work situation') and skill discretion ('opportunities available to learn skills and competencies') (Karasek, 1979; Karasek & Theorell 1990).

The dimensions of this model are 'interactive' (Karasek, 1979; Cox & Griffiths; 1995) because within this model, employees can be arranged into four work-status categories, namely, active (high control/high demand), passive (low control/low demand), relaxed (high control/low demand) and job strain (low control/high demand). As many studies have shown that reduced social support at work enhances the negative effects of high job strain (Johnson & Hall; 1988; Johnson et al., 1989; Landsbergis et al., 1992), the model was extended to incorporate social support. This dimension included questions regarding support from both supervisors and colleagues.

Studies have shown that job strain is associated with many adverse health outcomes such as cardiovascular diseases (Schnall et al., 1994), mental illnesses (Karasek and Theorell, 1990; Bourbonnais et al., 1996), functional decline in health status (Cheng et al., 2000) and adverse

reproductive outcomes (Brandt and Nielsen, 1992). Some studies, on the other hand, did not find an association (Reed et al., 1989; Kuper et al., 2007).

Cross-cultural adaptation of questionnaire tools is a necessary method to reach conceptual equivalence between the original and the target versions of the questionnaire tools. These procedures must ensure that the items of the questionnaire are well translated linguistically, culturally adapted and validated psychometrically through testing the questionnaire in a representative sample and then comparing validation results with theresults from other populations (Ferraz, 1997; Guillemin et al., 1993; Beaton et al., 2000). This in turn, will enhance the comparability of questionnaire tool responses across populations with different languages and cultures (Beaton et al., 2000; Willgerodt et al., 2005).

The importance of measuring occupational stress in recent years has encouraged many scholars to test the validity and reliability of the Karasek model in many industrial countries. There are two versions of Karasek questionnaires assessing the psychosocial work environment, namely, the Job Content Questionnaire (JCQ) (Karasek, 1998; Hadi et al., 2006) and its Scandinavian version known as the Demand-Control-Support Questionnaire (DCSQ) (Theorell & Karasek, 1996; Van der Moerf & Maes, 1999; Landsbergis & Theorell, 2000). In the latter questionnaire, there are five psychological demand items and six job control items which are also covered by the JCQ.

The main differences are in the total number of items (DCSQ has 17 items compared with 49 items (full version) and 22 items (shorter version) for JCQ); the format of support questions (six items), which are oriented towards working environment; the frequency based grading system; and the small number of psychometric validation studies conducted for the DCSQ measurement (Sanne et al., 2005). The shorter version of JCQ, which is most commonly used, contains nine decision latitude items (six items for skills discretion and three on

decision authority); five psychological job demand items; and eight workplace support items (supervisors support (four items) and co-workers' support (four items)).

Many studies have been conducted to validate Karasek's JCQ psychometrically and these allow comparison between validated versions in different languages including Japanese (Kawakami et al., 1995), French (Brisson et al., 1998), Chinese (Cheng et al., 2003), Malaysian (Edimansyah et al., 2006), South Korean (Ki-Do et al., 2007), Brazilian (de Araújo & Karasek, 2008), Persian (Choobineh et al., 2011) and other languages. Thus, it was decided to use this measure to evaluate the influence of psychosocial work factors on sickness absence and early retirement intention on our police sample. However, as the JCQ has not yet been translated into the Arabic language, this study aimed to develop an Arabic version of this questionnaire (the Arabic JCQ) and validate it linguistically and psychometrically using a sample from Abu Dhabi Police, one of the largest organisations in the Middle East.

5.2 Methods

5.2.1 The questionnaire

Twenty two items of the 49 items Karasek Job Content Questionnaire (JCQ) (Karasek, 1998; Hadi et al., 2006) were used to develop the Arabic JCQ. As stated above, this is a validated shorter version, each item of which has four responses ranging from strongly disagree to strongly agree, with the scores in each scale calculated as per the recommendations of the JCQ centre (2012). The Arabic JCQ was developed following linguistic and psychometric testing. These tests are described in more depth below.

5.2.2 Linguistic validation

Methods adopted in the linguistic validation were based on the principles recommended for linguistic adaptations by the European Regulatory Issues and Quality of Life Assessment

Group (EQIQA) (Piault et al., 2012), a review on cross-cultural adaptations of research self-reported questionnaires (Beaton et al., 2000) and used similar procedures to those used in the development of translated versions of Karasek JCQ (Choobineh et al., 2011; Cheng et al., 2003; Edimansyah et al., 2006). As shown in Figure 5.1, the linguistic validation was conducted in five main steps, namely, forward translation, synthesis, back translation, expert review and cognitive debriefing interviews.

In the forward translation process, the JCQ was translated from English to Arabic by two bilingual translators who speak Arabic (target language) as their first language and English as a second language. Each translator was asked to provide the written translation and record any challenging phrases and uncertainties in a separate document. As per the recommendations of Beaton et al. (2000) and in order to avoid ambiguity, one of these translators was familiar with the Karasek JCQ while the other was naïve to the questions and academic goals of the translations.

After translating the questionnaire into Arabic, the translated versions of the JCQ (FT1 and FT2) were reviewed by both translators and the researcher. A harmonized Arabic version (FT-12) of the JCQ was agreed after discussing and resolving all discrepancies and a synthesis report was assembled documenting all challenging phrases and uncertainties as well as stating which words were agreed upon and the justifications for these decisions noted (see forward translation report Table A 5.1.

The FT-12 version was then translated back into English (BT1 and BT2) by two other translators who speak English (target language) as a first language and Arabic as a second language. These translators were neither familiar with the questionnaire nor the occupational health subject. This was arranged to reduce the likelihood of unexpected meanings

(Guillemin et al., 1993). As with the forward translation, the back translators were asked to document any challenging phrases during the translation.

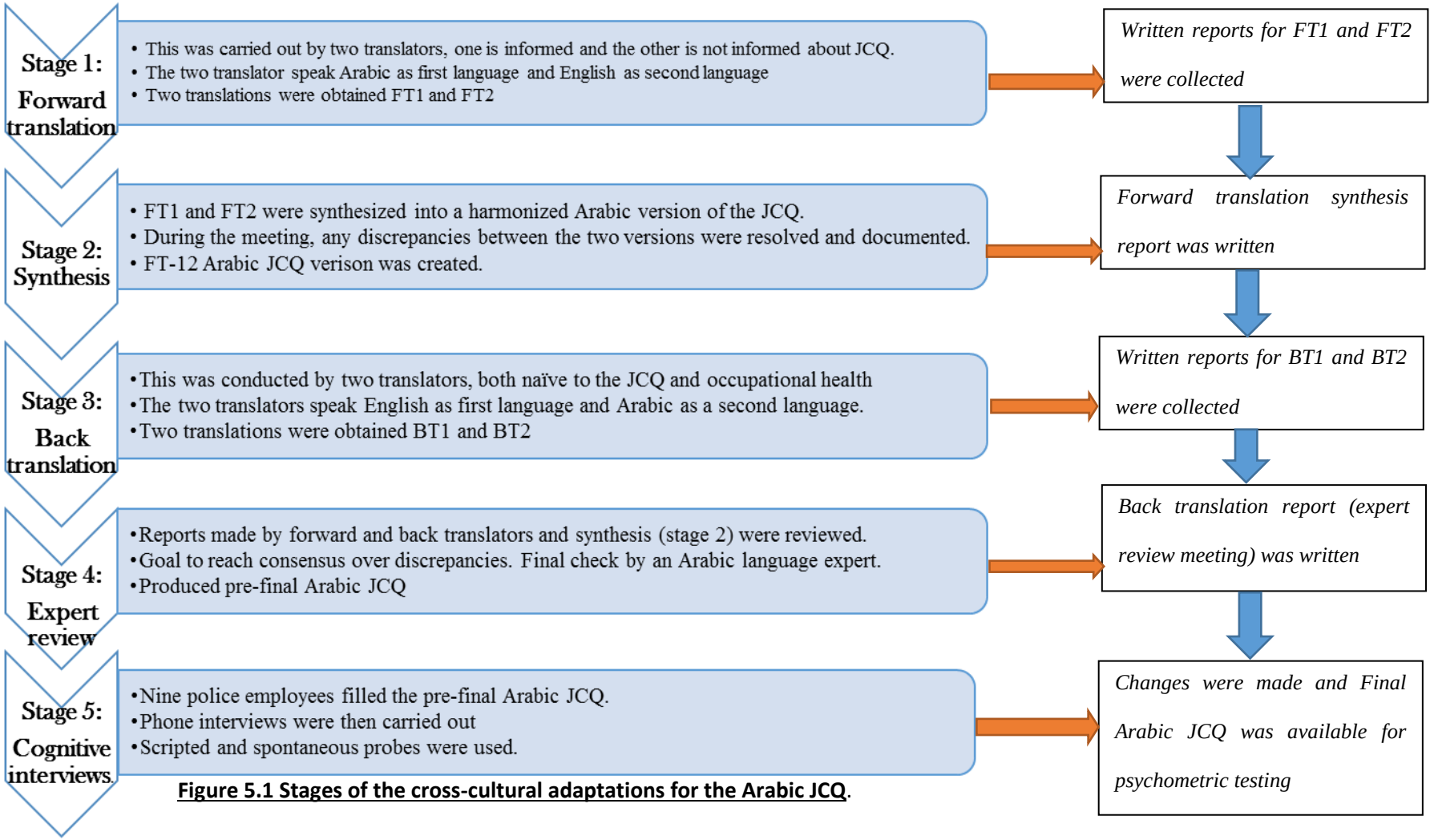

Figure 5.1 Stages of the cross-cultural adaptations for the Arabic JCQ.

After obtaining BT1 and BT2, a meeting was arranged between the forward translators, backward translators, an Arabic language expert and the researcher. The objective of this meeting was to review all translations and compare them with the original questionnaire by identifying any discrepancies, explain reasons behind them and reach a consensus as a group to resolve such discrepancies. A written report was made describing each discrepancy and justifications for use of particular words were documented (see back translation report, Table A 5.2). A pre-finalized version of the Arabic JCQ was developed and made available for the next step.

This version was reviewed by an Arabic language expert who has a Bachelor Degree in Arabic Language and has been teaching Arabic language for over twenty years in the United Arab Emirates (where the Arabic JCQ was to be tested psychometrically and distributed as a part of the main survey of this study). The expert reviewer recommended some changes to ensure that the questionnaire could be more easily comprehended by police officers (the target population of this study). These changes included the use of simpler vocabulary and sentences. Examples of other recommendations made by the expert review are also provided in Table A 5.2 (Q6.8 & Q6.9)

The final stage of linguistic validation involves carrying out cognitive interviews. This helps in eliminating any additional translation-related sources of miscommunication between the designer of the translated version of the questionnaire tool and the target population (where the survey is planned to be distributed) (Hughes & DeMaio, 2001; Piault et al., 2012; Beaton et al., 2000). Willis (2004) recommended that these interviews are conducted with 5-10 individuals from the targeted language of translation (the Arabic language in this study). Thus, nine police employees were invited and consented to participate in the cognitive interviewing.

Each participant was provided with a copy of the Arabic JCQ and given instructions to evaluate the questionnaire. These instructions include documenting the time required to fill the survey, putting a circle on phrases that were difficult to understand and rating the following; clarity of questions, appropriateness of research questions, cultural relevance and intelligibility. For example, for the appropriateness of research questions, the statement provided was 'the research questions of the survey are generally appropriate' and participants were asked to select a single response out of five options (strongly disagree, disagree, neutral, agree and strongly agree). A copy of the completed questionnaire and the evaluation sheet was obtained from each participant.

Each participant was then interviewed by telephone for an average duration of approximately 40 minutes. The interview was recorded. Prior to cognitive interviews, a set of scripted probes were developed by the researcher to assess participants' general comprehension of the Arabic JCQ scales. Whenever required, spontaneous probes were also used. The probing methods implemented were based on the recommendations of Willis (2004) on effective cognitive interviewing. These include probes that evaluate participants' comprehension, recall, decision process and response process, examples of which are provided in Table 5.1 (refer to a sample of the Interview Script document A 5.3). Participants were also asked to clarify reasons for putting a circle over some of the questions (if applicable).

After each interview, the researcher wrote a report about the interview (see a sample of the Data Collection Form in A 5.4) summarizing the findings and recommendations from each interview. Changes were made (see report on changes made after interviews in Table A 5.5) to the survey after consulting with the Arabic Language expert. Finally, attempts were made to contact the Job Content Questionnaire Centre (University of Massachusetts Lowell, USA), to invite them to review the Arabic JCQ. Several emails were sent, however, unfortunately no

response was received. The JCQ Centre recently moved to Denmark and a new email was sent in March 2016 and still awaiting reply.

Table 5.1 Examples of probing techniques and types used during cognitive interviewing

Probing technique	Probing type	Example
Comprehension for terms and overall interpretation of questions	Scripted	How do you define 'working hard' (***Q9.1***)?
Recall information/strategy	Scripted	Give some examples of taking decisions on your own (***Q6.1***)
Decision and response process	Spontaneous	Format of (***Q 6.7***) is 'On my Job I am given freedom to decide on how to do my work'. To ensure that participants fully understand the question, the following question was asked '*If you have four tasks to do, how can you explain this question given these different tasks*?'

5.2.3 Psychometric validation

The next step was to test the psychometric properties of the Arabic JCQ. This includes estimating the reliability and validity of the Arabic JCQ using similar statistical methods adopted by other authors who translated JCQ into other languages (Choobineh et al., 2011; Cheng et al., 2003; Edimansyah et al., 2006; Ki-Do et al., 2007). These methods include estimating Cronbach's Alpha, factor analysis and intraclass correlation coefficients to examine test re-test reliability. Psychometric testing was conducted in two stages. In the first stage, the Arabic JCQ was piloted among 108 administrative employees working in the financial and supportive departments of Abu Dhabi Capital Police Directorate between

November and December 2014. This department is the smallest in the Directorate and constitutes 7.5% of the entire population where the main survey was distributed (108/1,425).

The JCQ was a part of a six page occupational health and safety questionnaire (Document A 5.6 for copy of the survey). The objectives of this pilot study were to test the Arabic JCQ psychometrically, identify any other issues with the whole survey, calculate the sample size for the main survey and assess adequacy of survey distribution procedures. The response rate in the pilot study was 72% (78/108) with 19% non-respondents (20/108) and the remaining (9%) being on annual leave.

Test re-test reliability was examined through estimation of intra-class correlation coefficient (ICC) of two scores obtained two months apart. From the pilot study sample, 35 police officers agreed to participate in any future studies, of which 15 completed the Arabic JCQ on the second round. The criteria of Landis and Koch (1977) is used to interpret the intraclass correlation coefficients results with values < 0 indicating 'poor' reliability, 0 to 0.20 indicating 'weak', 0.21 and 0.40 'fair', 0.41 to 0.60 'moderate', 0.61 to 0.80 'substantial' and finally 0.81 and above considered 'almost perfect' reliability.

According to Comrey & Lee (1992) a sample size below 100 (as in this pilot study) gives poor factor analysis results (poor construct validity results) but 'very good' results can be obtained when the sample is >500. The subject to variable ratio in the pilot study was 3.5:1 (78 subjects and 22 variables) which is well-below the recommended 10 subjects per variable (Garson, 2008). Thus, a second stage of the psychometric testing was carried out using the main survey data obtained from the remaining employees of the Directorate (n=1,317 (1,425-108)) between Feb 1st and March 31st 2015. There were 760 completed surveys (response rate=58%) and the subject to variable ratio in this second psychometric testing stage was 34.5:1.

The psychometric testing results of the second stage are discussed in depth below. A brief description of the results of the first stage (the pilot study) is also provided below. Approval to distribute the surveys was obtained from the management of the Abu Dhabi Capital Police Directorate and responsibility for distribution was given to the Planning and Research Department of the Directorate. The survey contained a front page describing objectives of the research along with contact details of the researcher and University supervisors. After this section, participants were asked whether or not they consent to continue participating in the survey.

Data were collected and entered in STATA12 for statistical analyses. Means and standard deviations for each scale and subscale were calculated and compared with other similar studies. Cronbach's Alpha was estimated and used to evaluate the internal consistency of the scales and the subscales of the Arabic JCQ (using the recommended value of $\alpha \geq 0.70$ (Cronbach, 1951)). Construct validity was tested using principal axis factoring with orthogonal varimax rotation and loadings ≥ 0.3 were considered relevant. The psychometric testing plan also included assessing the test re-test reliability by estimating intraclass correlation coefficients of the two scores taken 2 months apart from the same respondents.

5.3 Results

This section primarily discusses findings of the psychometric testing using the full police sample (n=760), as linguistic validation results were described in **Section 5.2.2**. This section first provides a brief description of the findings of the pilot study.

5.3.1 Pilot study results

Table A 5.7 shows the mean scores of the scales and subscales of the Arabic JCQ along with minimum and maximum scores and that which is possibly attained using pilot study data. The mean scores for psychological job demand, job control and workplace support were 34.15,

66.50, and 24.97 respectively (Table A 5.7). There were only small differences, ranging from +3 to -4 between these findings and the US Quality of Employment Surveys (2007) (Table A 5.8).

As shown in Table A 5.9, the pilot study indicated acceptability of the internal consistency as coefficients were above the recommended value of 0.70 (Cronbach, 1951). The coefficients were 0.86, 0.70 and 0.86 for psychological job demand, job control and workplace support respectively. The exploratory factor analysis revealed five factors with the criterion of Kaiser's eigenvalue of more than one. The scree plot testing also confirmed this (Appendix A 5.10). The principal axis factoring with orthogonal varimax rotation of only loading values above 0.3 are shown in Table A 5.11. In general, the results of this factor analysis showed that the Arabic JCQ did not correspond to the theoretical framework of Karasek JCQ but these results were based on only 78 participants and therefore, may be unreliable.

5.3.2 Demographic characteristics

Table 5.2 describes the demographic characteristics of the main study sample. The mean age of the sample was approximately 32 ranging from 19 to 58 years of age with the majority being males (91%) and married (72%). Two-thirds of the sample were working on fixed morning, afternoon or night shifts; one-third had 4-7 years of service and another one-third had 12 years of service or more. Half of the sample fitted the category of a 'high school graduate' (without obtaining further educational certificates) and 22% did not finish high school.

5.3.3 Arabic JCQ scores

Table 5.3 shows the mean scores of the scales and subscales of the Arabic JCQ along with minimum and maximum scores in this study and the range of possible scores. Mean scores for psychological job demand, job control and workplace support were 33.4, 65.5, and 24.7

respectively. A comparison of these mean scores with national averages as reported by the US Quality of Employment Surveys (2007) on their evaluation of 4,495 men and women from 1969, 1972 and 1977 is provided in Table 5.4. Mean score of job demand in this study was higher than the US study while mean job control score for the population of the latter study was higher by approximately 5 points than the police sample of this study. The mean scores for the workplace support scale in the two studies were similar. In general, the standard deviations of this study were generally lower than that of the US study.

Table 5.2 Demographic characteristics of the main survey sample (Total sample=760)

Variable	Observations	%
Age		
Mean	31.7 (7.3)	-
Min-Max	19-58	-
Total	*608*	-
Gender		
Male	604	91
Female	60	9
Total	*664*	*100*
Marital status		
Married	469	72
Never married	146	22
Previously married	38	6
Total	*653*	*100*
Education		
Not a high school graduate	148	22
High school graduate	334	50
Diploma/Bachelor	152	21
Post-graduate degree	29	4
Total	*663*	*100*
Work experience		
3 years of less	56	9
4-7 years	199	30
8-11 years	166	25
12 years or more	232	36
Total	*653*	*100*
Work mode		
Fixed shifts	436	66
Rotations	225	34
Total	*661*	*100*

Table 5.3 Mean scores of the scales and subscales of the Arabic JCQ (22 items)

Scale	N	No. of items	Mean	SD	Min-max scores	Min-max attainable
Psychological demand	724	5	33.4	5.2	14-48	12-48
Job control	684	9	65.5	6.9	38-84	24-96
Skill discretion	691	6	34.4	5.3	14-46	12-48
Decision Authority	725	3	31.1	4.1	12-48	12-48
Workplace support	712	8	24.7	4.4	8-32	8-32
Co-workers support	720	4	12.4	2.3	4-16	4-16
Supervisors support	733	4	12.4	2.6	4-16	4-16

Table 5.4 Mean scores of the scales and subscales of the Arabic JCQ in comparison with the US population study

Scale	Mean	SD	Mean in the USA Quality of Employment Surveys (2007) (n=4,495)	SD	Differences in mean (pilot study – US study)
Psychological demand	33.40	5.20	30.90	8.48	+2.50
Job control	65.50	3.30	70.30	15.6	- 4.80
Skill discretion	34.4	5.30	33.50	8.50	0.90
Decision Authority	31.10	4.10	36.80	9.90	-5.70
Workplace support	24.70	4.40	24.60	4.26	+0.10
Co-workers support	12.40	2.30	12.73	2.53	-0.33
Supervisors support	12.40	2.60	11.94	4.85	+0.46

5.3.4 Internal consistency reliability

As shown in Table 5.5, all of the Cronbach's Alpha estimates for scales and subscales of the Arabic JCQ indicated acceptability of internally consistency as coefficients were above the recommended value of 0.70 (Cronbach, 1951). The coefficients were 0.86, 0.84 and 0.90 for psychological job demand, job control and workplace support respectively. One item of the skill discretion subscale (a subscale of job control scale) which is 'repetitive work' (CQ3) did not fit well with the other items in this subscale, as its correlation coefficient was much lower (0.58) than that of other items. The same applies for the item of having enough time at work to complete tasks (DQ3) of the psychological job demand scale (0.59).

The estimate of Cronbach's Alpha decreased when any item was removed from the psychological job demand and workplace support scales. A similar pattern was seen when any item was removed from the co-workers' and supervisors' support subscales. As for the Alpha internal consistency test for the job control scale, deletion of the 'repetitive work' item (CQ3) of the skill discretion subscale and the item of work 'allows own decisions' (CQ1) did not result in reduction of the Alpha Cronbach co-efficient.

Table 5.5 Internal consistency results for the Arabic JCQ (22 items)

Subscale items	Mean	SD	Item test[1]	Item Rest[2]	Alpha if item is deleted	Standardized Alpha of the subscale
Skill discretion (SD)						
Requires creativity ***(CQ2)***	3.0	0.8	0.75	0.61	0.78	
Repetitive work ***(CQ3)***	3.0	0.7	0.58	0.41	0.82	
High skills level ***(CQ4)***	3.1	0.7	0.79	0.66	0.77	
Variety ***(CQ5)***	3.1	0.7	0.73	0.58	0.78	
Learn new things ***(CQ6)***	3.1	0.8	0.79	0.67	0.76	
Develop own skills ***(CQ9)***	2.9	0.8	0.71	0.54	0.79	
						0.82
Decision Authority (DA)						
Allows own decisions ***(CQ1)***	2.7	0.8	0.76	0.48	0.75	
A lot of freedom ***(CQ7)***	2.7	0.8	0.85	0.63	0.59	
A lot of say ***(CQ8)***	2.8	0.8	0.82	0.60	0.62	
						0.74
Job control (SD and DA)						***0.84***
Psychological demand						
Very fast ***(DQ1)***	2.9	0.7	0.73	0.55	0.68	
Very hard ***(DQ2)***	3.1	0.7	0.74	0.56	0.67	
Enough time ***(DQ3)***	3.0	0.6	0.59	0.40	0.74	
Suffer conflicts ***(DQ4)***	2.3	0.8	0.67	0.44	0.73	
Excessive work ***(DQ5)***	2.1	0.8	0.74	0.56	0.69	
						0.86
Co-workers support (CS)						
Competent ***(CSQ1)***	3.0	0.7	0.83	0.69	0.83	
*Interest in me****(CSQ2)***	3.0	0.7	0.81	0.67	0.83	
*Friendly****(CSQ3)***	3.2	0.7	0.84	0.71	0.81	
*Helpful****(CSQ4)***	3.1	0.7	0.86	0.74	0.80	
						0.91
Supervisor's support (SS)						
Concerned welfare ***(SSQ1)***	3.6	0.8	0.89	0.80	0.89	
Pays attention ***(SSQ2)***	3.0	0.7	0.90	0.82	0.88	
Helpful ***(SSQ3)***	3.1	0.7	0.90	0.83	0.88	
Good organiser ***(SSQ4)***	3.1	0.8	0.87	0.77	0.90	
						0.91
Workplace support (CS and SS)						***0.90***

[1] Item test indicating correlation between individual items with total items in subscale. [2] Item rest: correlation between an item and the scale that is formed by all other items excluding the one being examined.

5.3.5 Construct validity

The exploratory factor analysis revealed three factors based on the criterion of Kaiser's eigenvalue of more than one. This was also confirmed by the scree plot testing which shows that the line started to flatten out after factor three (F3) (Figure 5.2). The principal axis factoring with orthogonal varimax rotation of only loading values above 0.3 are shown in this Table 5.6. The results show that psychological job demand scale and the two workplace support subscales have followed the theoretical framework. All workplace support items loaded on factor one (F1) with a small difference in the loading of items of each subscale; 58 (CSQ2) to 63 (CSQ3) for the co-workers' support subscale and 76 (SSQ4) to 81 (SSQ3) for the supervisors' support subscale.

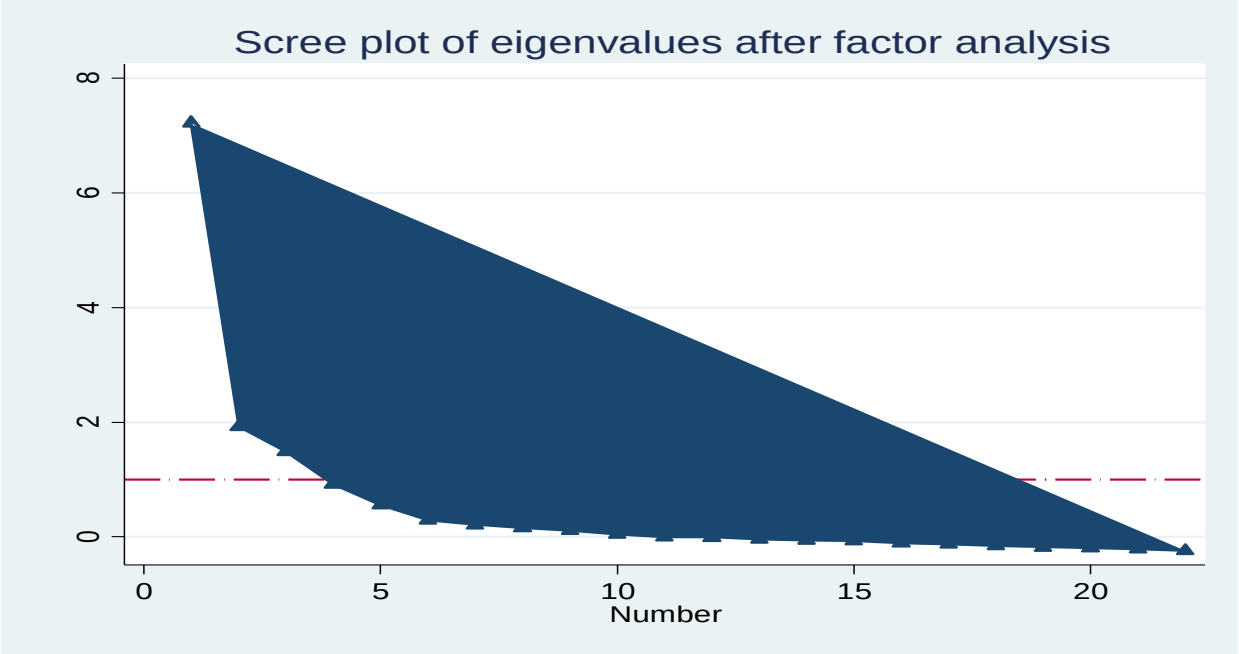

Figure 5.2 Eigenvalue results to determine number of factors for loading analysis

Table 5.6 Factor Analysis of the 22 item Arabic JCQ (n= 760)

Subscale items	Factors		
	F1	**F2**	**F3**
Skill discretion (SD)			
Requires creativity ***(CQ2)***		0.55	
Repetitive work ***(CQ3)***			0.46
High skills level ***(CQ4)***		0.40	0.51
Variety ***(CQ5)***		0.33	0.52
Learn new things ***(CQ6)***		0.56	
Develop own skills ***(CQ9)***		0.73	
Decision Authority (DA)			
Allows own decisions ***(CQ1)***		0.50	
A lot of freedom ***(CQ7)***		0.67	
A lot of say ***(CQ8)***		0.70	
Psychological demand			
Very fast ***(DQ1)***			0.63
Very hard ***(DQ2)***			0.66
Enough time ***(DQ3)***			0.37
Suffer conflicts ***(DQ4)***			0.53
Excessive work ***(DQ5)***			0.65
Co-workers support (CS)			
Competent ***(CSQ1)***	0.60		
Interest in me ***(CSQ2)***	0.58		
Friendly ***(CSQ3)***	0.63		
Helpful ***(CSQ4)***	0.59		
Supervisor's support (SS)			
Concerned welfare ***(SSQ1)***	0.80		
Pays attention ***(SSQ2)***	0.79		
Helpful ***(SSQ3)***	0.81		
Good organiser ***(SSQ4)***	0.76		
Eigenvalue	7.2	1.9	1.5
Variation explained	4.6	3.1	2.8
Variation explained %	43	30	27

The loading values are shown for loadings with an absolute value >0.30.

As for the job control scale, the three items of the decision authority subscale (CQ1, CQ7 & CQ9) and all items of the skill discretion subscale loaded on factor two (F2), apart from CQ3 item which loaded on factor three. In the latter subscale, item (CQ4) and (CQ5) loaded additionally on factor three (F3). Psychological job demand items loaded only on factor three (F3) with items loading range of 0.37 (DQ3 item) to 0.66 (DQ2 item). Three items of the skill discretion subscale (CQ3, CQ4 & CQ5) also loaded on factor three (F3). Factor one explained 43% of the explained variation while factors two and three explained 30% and 27% of the variation respectively.

5.3.6 Test re-test reliability

Test re-test reliability was evaluated using responses from 15 officers at two different times (pilot study and a second round which took place eight weeks after the pilot study). Mean age of the respondents was 35 and only two participants were females. As shown in Table A 5.12, the intraclass correlation coefficients for the Arabic JCQ were 0.22 for the psychological job demand scale, 0.54 and 0.50 for the job control and workplace support scales respectively. Highest intraclass correlation coefficients were seen for the skill discretion and co-workers support subscales (ICC= 0.72 & 0.71 respectively).

5.3.7 Summary of findings

This study aimed to develop an Arabic version of the Job Content Questionnaire (the Arabic JCQ) and validate it linguistically and psychometrically using a sample from Abu Dhabi Police. The short version of (twenty-two items of the 49 items Karasek JCQ) (Karasek, 1998; Hadi et al., 2006) were used to develop the Arabic JCQ. There were two main validation stages, the linguistic and the psychometric validation stages.

The linguistic validation was conducted in five main steps, namely, forward translation, synthesis, back translation, expert review and cognitive debriefing interviews. Changes were made to the Arabic JCQ after each step and justification for changes were also documented.

The psychometric validation stage included testing for internal consistency using Cronbach's Alpha test, construct validity testing or factor analysis using principal axis factoring with orthogonal varimax rotation and estimating intraclass correlation coefficients to examine test-retest technique. Psychometric validation was initially carried out using the pilot study sample (78 completed questionnaires). However, this sample was not sufficient to carry out construct validity testing because the sample size was below 100 and the subject to variable ratio was 3.5:1 (78 subjects and 22 variables) below the recommended 10 subjects per variable (Garson, 2008).

Thus, psychometric validation was conducted using the main study survey sample which included data from 760 participants with 34.5:1 subject to variable ratio. In the main survey sample, the mean scores for psychological job demand, job control and workplace support were 33.4, 65.5, and 24.7 respectively. These scores were generally comparable with the civilian sample of the US Quality of Employment Surveys (2007).

All the Cronbach's Alpha coefficients estimates for scales and subscales of the Arabic JCQ were above the recommended value of 0.70 (Cronbach, 1951). This indicates acceptability of internally consistency. As for construct validity testing, the results show that psychological job demand scale and the two workplace support subscales have followed the theoretical framework. Most of the job control scale items loaded on factor two with one items only loading on factor three (CQ3) and two items (CQ4 & CQ5) loading on factors two and three. Finally, the intraclass correlation coefficient (ICC) estimates for the Arabic JCQ showed

'fair' reliability for the psychological job demand scale (ICC=0.22) and moderate reliability for job control and workplace support (ICC=0.54 and 0.50 respectively).

5.4 Discussion

This study aimed to validate the Arabic version of the Job Content Questionnaire (JCQ) linguistically and psychometrically. The short version of the JCQ (22 items, nine control items, five demand items and eight workplace support items) was forward translated from English into Arabic and then back translated and reviewed by an Arabic language expert. Following this, nine cognitive interviews were carried out using scripted and spontaneous probes. After the interviews, only minor changes were required for the Arabic JCQ indicating acceptability of this translated version.

The mean scores for job control, demand and support in this study were generally comparable with other published studies. The mean psychological job demand score in this study (33.4) was similar to other Asian studies such as Japan (33.5) (Kawakami et al., 2000), China (33.5) (Cheng et al., 2003) and South Korea (34.5) (Ki-Do et al., 2007).

As for job control, the mean score for job control in the current sample (65.5) was similar to the Chinese (64.9) (Cheng et al., 2003) and the Persian (64.2) (Choobineh et al., 2011) studies but was lower than that of the Japanese (74) (Kawakami et al., 2000) and US cohorts (70.3) (USA Quality of Employment Surveys, 2007). This could reflect the hierarchal nature of the organisations examined, where decisions are often made by senior staff, such as police officers (in the current study) or nurses (in the Persian study) in comparison to the general work force employees in the Japanese (Kawakami et al., 2000) and US studies (USA Quality of Employment Surveys, 2007).

Examination of the components of the job control scale, skill discretion and decision authority, could provide insights into the reasons for such differences. The US cohort (USA

Quality of Employment Surveys, 2007) had a similar mean skill discretion score but a higher (36.8) decision authority score than this current study (31.1). This is consistent with our previous argument about the hierarchical nature of the policing jobs in our study compared with the US study.

The mean workplace support score for the current sample (24.7) was higher than that of other Asian studies which ranged from 21.7 in the Persian study (Choobineh et al., 2011) to 23.4 in the Chinese study (Cheng et al., 2003) although it was similar to the US cohorts (24.6). The subscales of co-workers support and supervisors' support were also higher than all other Asian studies. This may be because in the police force, high supervisory and colleague support is necessary as it enhances success of policing activities.

The estimates of Cronbach's Alpha for all the scales and subscales of the Arabic JCQ showed acceptable internal consistency as the coefficients were above the recommended value of 0.70 (Cronbach, 1951). These coefficients were generally higher than those reported by other Asian studies including the following JCQ versions; Chinese (Cheng et al., 2003), Malaysian (Edimansyah et al., 2006), South Korean (Ki-Do et al., 2007), Thai (Pitchaya, 2009) and Persian (Choobineh et al., 2011). Consistent with previous studies (Cheng et al., 2003; Ki-Do et al., 2007; Choobineh et al., 2011), the Alpha coefficient for the skill discretion subscale was higher than that for the decision authority subscale.

However, when comparing internal consistency results for the scales of the Arabic JCQ, the lowest Alpha coefficient was seen for the job control scale. This contrasts with the findings of previous studies where the Alpha co-efficient was lowest for the job demand scale (Cheng et al., 2003; Edimansyah et al., 2006; Ki-Do et al., 2007; Choobineh et al., 2011). However, the Alpha coefficient for the job control scale in this study (0.84) is still the highest when compared with Alpha co-efficient of other Asian studies that ranged from 0.54 (Choobineh et al., 2011) to 0.82 (Pitchaya, 2009).

Items within a scale could be dropped or changes to question format could be considered when the item test and item rest correlation of an item are much lower than that of other items in the subscale and also when the Alpha coefficient for the scale increases with removal of the item (Nunnally et al., 1994). In the current study, Alpha decreased with the removal of any of the items from the scale and subscales of workplace support, thus indicating well-fitting workplace support items, in line with many studies (Cheng et al., 2003; Edimansyah et al., 2006; Ki-Do et al., 2007; Choobineh et al., 2011).

The item test and item rest correlations between each item and the total items was lowest for ‘repetitive work’ (CQ3) in the skill discretion scale, and for ‘having enough time at work to complete tasks’ (DQ3) of the job demand scale. However, when these items were deleted from each scale, Alpha remained unchanged with the removal of the ‘repetitive work’ from the skill discretion scale and decreased the least when ‘enough time’, among the job demand items, was removed. Alpha only increased slightly with deletion of (CQ1) item work ‘allows own decisions’ (from 0.74 to 0.75) of the decision authority subscale. As correlations between each of the three items (CQ1, CQ3 & DQ3) and the total items in the subscale, are generally moderate (>0.40) and little or no changes occurred in Alpha when each item was removed, there is no clear indication for the need to rephrase or remove any items from the main survey.

Results of the test re-test reliability have shown moderate similarity between participants' first and second time responses for the job control and workplace support questions. However, the intraclass correlation coefficient for the psychological job demand scales was 0.22 indicating 'fair' reliability. The intraclass correlation coefficients for the Arabic JCQ scales are generally much lower than that of the Portuguese JCQ which ranged from 0.82 to 0.91 (Alves et al., 2004). In this study, responses from 15 officers at two different times were used which is considered not sufficient to carry out test retest reliability (Shoukri et al., 2014).

In general, the results of the factor analysis have shown the Arabic JCQ corresponded to the theoretical framework of Karasek JCQ. The loading of scale items in this study in three factors is in line with the findings of the many studies that validated Karasek's JCQ into other languages (Edimansyah et al., 2006; Ki-Do et al., 2007; Choobineh et al., 2011). In this study, only job control items did not load mainly on one factor as 'repetitive work' item (CQ3) loaded only on factor three (F3) and 'high skill level' and 'variety' items (CQ4 & CQ5 respectively) loaded on factors two and three.

Other Karasek JCQ validation studies have shown a similar pattern, in particular for 'repetitive work' (Ki-Do et al., 2007; Pitchaya, 2009; Choobineh et al., 2011) and 'variety' (Ki-Do et al., 2007; de Araújo & Karasek, 2008; Pitchaya, 2009) job control items. The loading of the latter job control items on the same factor in which job demand scale items were loaded could be attributed to the high correlation between these job control items and the job demand scale in general. Pitchaya (2009) provided two additional reasons. First, some job control items such as 'variety' and 'high skill level' items may not only reflect one's level of control of job tasks but also the level of complexity and difficulty of work tasks. This could lead to high intellectual demand at work and result in occupational stress. Secondly,

repetitive work is highly correlated to job demand as it reduces one's sense of control over work activities and eventually leads to a state of a 'routine workload'.

Similar to some Asian studies (Edimansyah et al., 2006; Ki-Do et al., 2007; Pitchaya, 2009), items of the supervisor's support and co-workers support loaded on one factor. Thus, there is no clear difference between the two types of workplace support in this sample of police employees in contrast with other studies in the Asian (Cheng et al., 2003; Kawakami et al., 1995; Choobineh et al., 2011) and non-Asian continents (de Arajuo & Karasek, 2008; Niedhammer, 2002; Pelfrene et al., 2001).

Strengths and Limitations

This study is the first of its kind to validate an Arabic version of the Karasek JCQ. The study followed a standardized approach for validation of the JCQ into Arabic (Piault et al., 2012; Beaton et al., 2000). Another strength of this study is that it provides further insights to add to the limited available literature on job control, demand and support on police employees, an occupation recognized to be highly stressful (Demerouti et al., 2000; Mark& Smith, 2012). Other strengths of this study include the high response rate (58%) and the large sample size (n=760) which is considered to be sufficient to conduct construct validity testing during the validation of questionnaire tools into other languages (Comrey & Lee, 1992).

External reliability of a measure is a crucial element of validation process of questionnaire tools into other languages (Altman, 1990). As there are many Arabic dialects in the Middle East, it is recommended that this Arabic version of the JCQ is re-examined prior to use, particularly if intending to use it in countries outside the Gulf Corporation Council (GCC). Finally, although it is recommended that analyses should be carried out stratified by gender, as psychosocial responses are gender dependent (Karasek et al., 1998; Kawamaki et al., 1995), this was not feasible as only 9% of the sample were females.

Chapter 6: Work predictors of sickness absence and early retirement intention and the relationship between them in a sample of police officers.

6.1 Introduction

Police officers have a high risk of cardiovascular diseases (Reviere & Young, 1994), suicide (Violanti, 1997) and occupational injuries (Health and Safety Executive (HSE), 2015). For example, in 2012, the rate of injuries in the UK police force was four times higher than the rate for 'all occupations'. Similarly, higher rates for police were reported for stress, anxiety and depression (HSE, 2015; Collins and Gibbs, 2003; Juniper et al., 2010).

Although police jobs are intrinsically hazardous, studies have shown that policing tasks are mostly light physically but officers are more likely to be involved in stressful situations (mentally demanding) that increase the risk of occupational stress (Nirkko et al., 1982; Soininen, 1995). Occupational stress is associated with sickness absence (Kivimaki et al., 1997; Virtanen et al., 2007) and early medical retirement (Summerfield, 2011). For some officers, particularly those who are not involved in field work, the majority of working time is spent on sedentary tasks (Steinhardt et al., 1991) but officers are required to show flexibility and adaptability to respond quickly to sudden changes in the working environment (HSE, 2011).

Thus, police departments face difficulties in meeting meet their legal health and safety obligations as occupational risks are inevitable; hence, they are encouraged to integrate their health and safety management systems with the operational arrangements. In the UK, the Health and Safety Executive (2011), in co-operation with the UK Police force, published a document titled *'Striking the balance between operational and health and safety duties in the*

Police' which recognized the difficulties in implementing health and safety regulations in police organisations and provided recommendations to overcome such issues. One way to demonstrate commitment to the improvement of working environment in the police is by the collection and analysis of occupational health data such as sickness absence and early retirement intention. Thorough analysis of such data will help police organisations to prioritise plans and improve the health and wellbeing of officers, in turn contributing to strengthening the fight against crime and minimizing the number of occupational injuries and premature exit from paid work.

The results of the first systematic review presented in Chapter Two showed that few studies examined the work determinants of sickness absence in the police. There are also small number of studies investigating the influence of work factors on early retirement intentions. The association between sickness absence and early retirement intentions is also rarely studied. The risk of disability retirement associated with sickness absence using various sickness absence measures obtained from the employees' electronic register has already been presented in Chapter Four of this thesis.

This study aimed to evaluate the influence of psychosocial work factors, physical work factors and employees' perception of organisational health and safety management system on two outcomes, namely, sickness absence and early retirement intentions, using a sample from the Abu Dhabi Police. This study also examined the relationship between self-reported sickness absence and early retirement intention.

6.2 Methods

6.2.1 Design and collection of data

An approval to distribute occupational health surveys to Abu Dhabi Police employees was granted by the Secretary General of the Office of His Highness Deputy Prime Minister and

Minister of Interior of the UAE in 2012 (Appendix Document A 6.1). Ethical approval was also obtained from the Health Authority of Abu Dhabi (HAAD) in 2013 (Document A 6.2). In 2014, an official letter was sent from the Human Resource Directorate of Abu Dhabi Police to the Capital Police Directorate to allow the distribution of the surveys to the employees of the latter Directorate (Document A 6.3)

This Directorate was selected for two main reasons. First, a wide range of policing activities are carried out by this Directorate, including investigation, traffic, crime scene support, community policing and other activities. Secondly, this Directorate has five police stations covering different areas of central Abu Dhabi with a total of 1,425 employees. These stations are considered to be some of the busiest in fighting crime in the United Arab Emirates.

A liaison officer in the Planning and Research Department of the Directorate was given responsibility for the distribution of surveys in each department of the Directorate. A pilot study was carried out to: evaluate the validity of the Arabic version of the Job Content Questionnaire (JCQ); assess the agreed data distribution procedures; determine sample size required to detect significant difference in the main study and make any necessary changes in relation to the language or format of the questionnaire.

The pilot survey was initially distributed between November and December 2014 to 108 employees of the financial and supportive departments. After two weeks from the start of survey distribution (mid-November), 56 (52%) surveys were completed and the liaison officer sent a reminder for the officers to fill in the survey. By the first week of December, 69 (64%) surveys had been answered and a final reminder was sent. Finally, by the end of the pilot (the second week of December), a total of 78 (72%) employees had participated.

6.2.2 Power of the main survey

One of the main objectives of the pilot study was to determine the sample size required to detect significant differences, with a given power, between groups in the main survey. The prevalence of having sickness absence of ≥4d in the pilot study was 23%, lower than the prevalence of holding early retirement intention (56%, 39/70). Since the sample size required to detect a significant difference in an exposure, for a given power, is smaller if the outcome is more prevalent, the power and sample size calculations were addressed using the psychosocial and physical work exposures in relation to the sickness absence outcome.

The sample size calculation procedure was conducted in five steps. First, using responses of the pilot study, respondents were classified into low or high occupational exposure categories and the prevalence of the reference group calculated. For job demand, control and support at work, the median of the sample was used to classify participants into low or high exposure categories. In the main study, these three work exposure variables are analysed using three levels and it was anticipated that the power would be roughly the same since we were comparing more extreme groups and the OR may be expected to be higher than we are assuming when comparing just two groups. For physical work exposures, participants were considered to have high exposure if they were exposed to such hazards for half or more of their working time. Secondly, odds ratios for the relationship between each work-related variable and sickness absence were obtained from the literature and used as reference values that were expected to be found between different exposure groups in the main survey.

Thirdly, the estimated prevalence of outcome (having sickness absence of ≥4d) in the reference group for each work exposure was calculated, such that the prevalence of the outcome, with the given odds ratio, in the whole sample is the same as that observed in the whole pilot study (23%). Fourthly, the power was set at 80% and level of significance set at the default value of 5% and the sample size calculated using the STATA command:

power twoprop (estimated prevalence of the outcome in the reference work exposure group), nratio (prevalence of the exposed group) divided by (prevalence of the reference group)) oratio (literature) power (0.80) continuity

Finally, after obtaining the sample size for each work related variable, an inflation factor of 39% was added to account for potential non respondents since 30/108 employees did not respond to the pilot study (hence inflation factor is 108/78 = 1.39).

Table 6.1 shows the sample size required to detect statistically significant differences, with 80% power, between various exposure groups in the main survey using the pilot study results. The table also shows the numbers used in the calculation of the sample size for each work exposure variable for each of the five steps above. In general, as the main survey is distributed to the remaining employees of the Directorate (1,425-108= 1,317), the sample size required to detect differences between groups with various work exposures at the given power of 80% is achieved for all the variables, except for exposure to vibration. Therefore, except for exposure to vibration, the main survey has over 80% power to detect differences, at the 5% level of significance, between groups with various work exposures

Table 6.1 Sample size required to detect statistical difference, at the 5% level of significance, with 80% power in the main survey, using estimates from the pilot study

Work related variable	Prevalence of SA outcome in reference group[1]	*p1* (%)[2]	Odds ratio[3]	Literature evidence	Sample size required	Adjusted sample size [4]
Job demand*	0.18	50	1.70	(Gimeno et al., 2004)	*694*	***965***
Job control*	0.18	50	1.80	(Gimeno et al., 2004)	*562*	***781***
Work place support*	0.18	50	1.68	(Alavinia et al., 2009)	*726*	***1009***
Vibration	0.20	67	1.57	(Alavinia et al., 2009)	*1008*	***1401***
Noise	0.20	75	2.08	(Clausen et al., 2013)	*430*	***598***
Ergonomics	0.18	66	2.40	(Sterud, 2014)	*268*	***373***
Lifting people	0.20	85	2.46	(Voss et al., 2001)	*410*	***570***
Working while standing	0.19	59	1.79	(Sterud, 2014)	*567*	***788***
Repetitive work	0.16	39	2.12	(Voss et al., 2001)	*390*	***542***
Carrying heavy objects	0.19	77	2.46	(Voss et al., 2001)	*306*	***425***

[1] This is chosen so that the overall prevalence of sickness absence in the whole study is 23%, the observed prevalence of having sickness absence of ≥4d in the pilot study.

[2] This is the prevalence of the control or reference group (not exposed). It was assumed that we have equal size of groups for job control, job demand and workplace support as these variables are split by the median into low and high categories.

[3] Odds ratio value from the literature.

[4] Sample size required after allowing for non-response**.**

6.2.3 Main survey

Following the pilot study, the Occupational Health and Safety Survey was distributed to 1,317 employees of other departments of the Capital Police Directorate of Abu Dhabi Police between Feb 1st and March 31st 2015. The survey was answered by 760 employees (58%); 230 (17%) refused to participate; 259 (20%) did not return the surveys; and 68 (5%) were not surveyed as they were on an authorized long term leave for various reasons (and did not receive the survey). Excluding that last group, the response rate was 61% (760/1,249).

6.2.4 Study variables

a) Outcomes/dependent variables

Sickness absence.

Participants were asked about the number of days of sickness absence in the last 12 months. Response options were none, 1-3d, 4-7d, 8-28d, 29-90d and ≥ 91d. This self-reported sickness absence measure has been used in many previous studies (Evans & Steptoe, 2002; Niedhammer, 2012; Taloyan, 2012). For the analysis, the last four responses in the sickness absence outcome were combined into one category (≥4d).

Early retirement intention.

As with Von Bonsdorff et al. (2009 & 2010) and Neacsiu (2013), early retirement intentions were assessed by asking participants if they had ever thought of retiring before reaching retirement age with the following responses, 'Never', 'Yes, often', 'Yes, sometimes' and 'I have already applied'. During statistical analysis, participants were categorized into either holding ('Yes, often', 'Yes, sometimes' and 'Already applied') or not holding intentions to retire early.

In the UAE, the retirement age is 60 for males and 55 for females, however, government employees are entitled to apply for early exit from paid work after completing 20 years of

service (Abu Dhabi Government E-Gate, 2013). Therefore, the early retirement intention question was reformulated to ask whether participants intend to take early retirement after completing the years of service that make them eligible for early exit and before reaching the full legal retirement age. Participants who reported an intention to retire early were additionally asked to specify the primary reason for such intention by selecting one out of seven responses, similar to the responses used in the SHARE study (SHARE Questionnaire, 2004).

b) Explanatory factors/independent variables

Psychosocial work factors

These were 22 psychosocial items of the 49 items of the JCQ of Karasek's (1998) model. Nine of these items were for job control, five job demand items, and eight workplace support items. These measures have been used previously to examine the risks of job control, demand and support on sickness absence (Niedhammer, 2013; 1998, Lahelma, 2010) and early retirement intentions (Heponiemi et al., 2008; Neacsiu, 2013). The questionnaire was translated into Arabic; validation results were discussed in Chapter Five. Further details of the psychosocial work factors are provided in Table A 6.4.

The distribution of responses for the job control, demand and support variables were used to classify participants to low, medium and high categories. Participants were then arranged into four psychosocial work-status categories, namely, active (high control/high demand), passive (low control/low demand), relaxed (high control/low demand) and job strain (low control/high demand).

Physical work exposures

The physical work items in the survey included questions regarding intensity of nine physical exposures with questions based on the European Working Conditions Survey (2010). For

physical work exposures, participants were categorized into being either exposed less than half of the time or half of the time or more. A combined physical exposure was also created. More details are provided in Table A 6.4.

Perceptions of organisational health and safety management systems

Using the UK Health and Safety Executive's guide for successful health and safety management system (1997), participants were asked seven questions regarding their perception of the health and safety management systems implemented by the Abu Dhabi Police. An item reflecting overall perception of health and safety management system was also created (from the aforementioned items, HSMST). Participants were categorized into having favourable (strongly agree and agree) and unfavourable (strongly disagree and disagree) perceptions (Table A 6.4).

Other covariates

Other covariates included demographic variables, health indicators, lifestyle, social life factors and other non-work factors**.** Table A 6.5 describes how these factors were classified in this study.

6.2.5 Data entry and statistical analysis

Surveys were collected by the researcher and entered manually into Excel by two PhD students elsewhere. Missing data ranged from 3% (for the job demand variable) to 38% (for the heavy exercise variable) (Table A 6.6). Due to the short time frame, double entry of data was not feasible. After data entry, a random sample of eight completed questionnaires were selected and the survey responses and data entered were compared. No data entry errors were detected among this sample. The data were then transferred from Excel into STATA 13.

Descriptive analyses included the overall distribution of responses and missingness in each subcategory of work and non-work factor. The association between each work and non-work factor and sickness absence and early retirement intention categories was also examined.

The risk (odds) of having sickness absence of four days or more (≥4d) compared with 0 to 3 days (0-3d) and the risk of holding early retirement intention compared with not intending to retire early were estimated using logistic regression. These analyses were initially carried out for all work and non-work factors in the full sample.

The risk of sickness absence and early retirement intentions were then evaluated in relation to psychosocial work factors, employees' overall perception of health and safety management system (HSMST) and the combined physical exposure variable (as this study primarily focuses on these factors) using two models for the adjustment of covariates. This first stage of the analysis compared the unadjusted odds ratio estimates with those from Model I, which adjusted for age and gender, and Model II which additionally adjusted for other demographic factors that are associated with the outcome. These analyses were carried out using the restricted sample of responders with no missing values for any of the covariates in Model II.

A second stage of the analysis incorporated three additional models. Each included all the covariates in the preceding model. As with Model II, covariates were added only if they were also associated with the outcome. Model III additionally included social life, health and lifestyle factors, while work setting factors were also added in Model IV. The fully adjusted model added the psychosocial and physical factors as well as employees' perception of health and safety management system. The analyses in this stage were conducted using the restricted sample of the fully adjusted model.

A comparison between results of the risk of sickness absence and early retirement intention from psychosocial work factors and total employees' perception of health and safety

management system in the unadjusted model and model II using the full sample and the restricted sample of the fully adjusted model was also conducted to assess whether there was any selection bias in the smaller samples.

Finally, the influence of various self-reported durations of sickness absence on the risk of holding early retirement intention compared with not intending to retire early was evaluated using logistic regression. This was carried out using the full sample and the restricted samples of model II and the fully adjusted model.

6.3 Results

This section provides descriptive statistics regarding distribution of work factors and their (unadjusted) association with sickness absence and early retirement intentions. This study evaluates only the following work factors; psychosocial work factors, overall perception of health and safety management system and combined physical exposure.

6.3.1 Descriptive statistics

The psychological work status of 45% of the participants is classified as ‘passive’ while 17% were considered as ‘strain’ (Tables 6.2). More than two-thirds of employees reported overall favourable perception of the health and safety management system (HSMST, Tables 6.2).

Table 6.2 Overall distribution of work factors and sickness absence.

			Days of Sickness absence (SA)				
Work factor	**n (%)**	**n with SA data**	**0d n (%)[2]**	**1-3d n (%)**	**4-7d n (%)**	**≥ 8d n (%)**	**Odds Ratio[1] (95% CI)**
Sickness absence (outcome)		670	340 (51)	161 (24)	105 (16)	64 (10)	
Job control							
High	202 (30)	176	96 (55)	38 (22)	27 (15)	15 (9)	1
Medium	230 (34)	211	103 (49)	56 (27)	32 (15)	20 (9)	1.04 (0.65-1.66)
Low	252 (37)	231	113 (49)	57 (25)	38 (16)	23 (10)	1.14 (0.72-1.80)
Total	*684 (100)*	*618*	*312 (50)*	*151 (24)*	*97 (16)*	*58 (9)*	
Job demand							
Low	221 (31)	194	96 (49)	54 (28)	19 (10)	25 (13)	1
Medium	265 (37)	247	116 (50)	58 (23)	51 (21)	22 (9)	1.43 (0.92-2.20)
High	238 (33)	209	119 (57)	45 (22)	30 (14)	15 (7)	0.93 (0.58-1.49)
Total	*724 (100)*	*650*	*331 (51)*	*157 (24)*	*100 (15)*	*62 (10)*	
Co-workers support							
High	250 (35)	214	110 (51)	52 (24)	36 (17)	16 (7)	1
Medium	317 (44)	300	158 (53)	70 (23)	48 (16)	24 (8)	0.98 (0.65-1.48)
Low	153 (21)	137	61 (45)	37 (27)	16 (12)	23 (17)	1.23 (0.76-2.01)
Total	*720 (100)*	*651*	*329 (51)*	*159 (24)*	*100 (15)*	*63 (10)*	
Supervisors support							
High	281 (39)	244	119 (49)	64 (26)	40 (16)	21 (9)	1
Medium	284 (39)	268	141 (53)	58 (22)	46 (17)	23 (9)	1.04 (0.70-1.54)
Low	168 (23)	147	74 (50)	38 (26)	19 (13)	16 (11)	0.93 (0.58-1.51)
Total	*733 (100)*	*659*	*334 (51)*	*160 (24)*	*105 (16)*	*60 (9)*	
Workplace support							
High	265 (37)	231	122 (53)	56 (24)	36 (16)	17 (7)	1
Medium	295 (41)	276	136 (49)	66 (24)	49 (18)	25 (9)	1.23 (0.81-1.84)
Low	152 (21)	136	67 (49)	36 (26)	15 (11)	18 (13)	1.07 (0.65-1.77)
Total	*712 (100)*	*643*	*325 (51)*	*158 (25)*	*100 (16)*	*60 (9)*	
Psychological work							
Relaxed	135 (20)	122	60 (49)	31 (25)	23 (19)	8 (7)	1
Passive	302 (45)	277	129 (47)	72 (26)	42 (15)	34 (12)	1.10 (0.68-1.80)
Active	117 (18)	98	58 (59)	20 (20)	12 (12)	8 (8)	0.75 (0.39-1.42)
Strain	114 (17)	105	57 (54)	24 (23)	17 (16)	7 (7)	0.87 (0.47-1.60)
Total	*668 (100)*	*602*	*304 (51)*	*147 (24)*	*94 (16)*	*57 (9)*	
Overall perception of HSE management system (HSMST)							
Favourable	561 (78)	509	254 (50)	120 (24)	89 (17)	46 (9)	1
Unfavourable	157 (22)	141	75 (53)	35 (25)	14 (10)	17 (12)	0.78 (0.50-1.21)
Total	*718 (100)*	*650*	*329 (51)*	*155 (24)*	*103 (16)*	*63 (10)*	
Combined physical exposure							
Low	233 (37)	220	102 (46)	49 (22)	42 (19)	27 (12)	1
Moderate	188 (30)	170	98 (58)	40 (24)	19 (11)	13 (8)	**0.50 (0.31-0.81)**
High	215 (34)	192	97 (51)	48 (25)	29 (15)	18 (9)	0.70 (0.45-1.09)
Total	*636 (100)*	*582*	*297 (51)*	*137 (24)*	*90 (15)*	*58 (10)*	

[1] Unadjusted odds ratio of having sickness absence of ≥4d compared with 0-3d in the full sample

[2] Row percentages

6.3.2 Work factors and the risk of sickness absence

The risk of sickness absence in this section refers to the odds of having sickness absence of ≥4d compared with 0-3d. In this police sample 51% had no days while 26% and 10% had ≥ 4d and ≥ 8d of sickness absence respectively (Table 6.2).

There was little evidence for any association between the psychosocial work factors and sickness absence in the unadjusted analyses. Police employees with moderate (versus low) exposure to combined physical work factors were less likely to have sickness absence (OR= 0.50, 95%CI=031-0.81) (Table 6.2). There appeared to be a protective effect on sickness absence from exposure to three of the physical factors; noise, carrying heavy objects and working while standing more than half of the working time (versus less than half) (OR=0.57, 95%CI=0.38-0.85, OR=0.83, 0.56-0.92 and OR=0.63, 0.44-0.92 respectively) (Table A 6.7).

Adjustment models

Table 6.3 shows the odds ratio of the association between work factors and the risk of sickness absence in three models; unadjusted, adjusting for age and gender (model I) and adjusting additionally for other demographic factors (partner working status as a covariate (Table A 6.9) (model II).

In general, the associations between work factors and the odds of sickness absence in the unadjusted model (Table 6.3) of this restricted sample is similar to the odds ratio of the unadjusted model of the full sample (Tables 6.2). The only difference is the significant protective effect in officers with high combined physical exposures (OR=0.53, 95%CI= 0.31-0.89). Little change in the associations was seen between models I and II.

Using the restricted sample of model II, exposure to five physical work factors (vibration, noise, working in painful positions, working while standing, and repetitive arm/hand movements) half of the working time or more were associated with lower odds ratios of

sickness absence than seen from the unadjusted model, ranging from OR=0.43 (95%CI=0.26-0.71) for exposure to noise to OR=0.64 (95%CI=0.41-0.98) for exposure to vibration (Table A 6.19).

The second stage of adjustments was carried out using six statistical models (Table 6.4). The influence of work factors on the odds of sickness absence in this restricted sample in the unadjusted model and model I was generally similar to that of the full police sample (Table 6.2). The influence of work factors on the odds of sickness absence in the unadjusted model and model I in the full sample and the restricted sample of the fully adjusted model is shown on Table A 6.21. The only major difference is the significant protective effect seen in employees with high (versus low) exposure to the combined physical work exposures (OR=0.38, 95%CI=0.21-0.70). This association became non-significant in the fully adjusted model.

In general, there was little change in the associations between the six models for job control, co-workers' and workplace support, and participants in the job 'strain' category compared with those in the 'relaxed' category. A marked increase in the odds of sickness absence, non-significant still, was noticed in model III for those in the 'passive' job category (versus 'relaxed') (67%), medium (versus low) job demand (22%) and medium (versus high) supervisors' support (16%).

Table 6.3 Work factors and the odds ratio of sickness absence of three statistical models[1].

Work factor	Unadjusted	Model I	Model II
Job control (n=458)			
High	*Reference*		
Medium	1.03 (0.60-1.76)	1.11 (0.64-1.91)	1.09 (0.63-1.88)
Low	1.07 (0.63-1.81)	1.05 (0.61-1.79)	1.07 (0.63-1.84)
Job demand (n=477)			
Low	*Reference*		
Medium	1.26 (0.75-2.12)	1.30 (0.77-2.21)	1.28 (0.75-2.18)
High	0.93 (0.53-1.60)	1.00 (0.57-1.75)	1.00 (0.58-1.77)
Psychological work classification (n=449)			
Relaxed	*Reference*		
Passive	1.21 (0.61-2.11)	1.28 (0.72-2.28)	1.30 (0.73-2.30)
Active	0.89 (0.43-1.81)	0.99 (0.48-2.04)	1.03 (0.49-2.14)
Strain	0.88 (0.44-1.76)	0.99 (0.49-2.00)	1.02 (0.50-2.06)
Co-workers support (n=476)			
High	*Reference*		
Medium	1.02 (0.63-1.64)	1.03 (0.64-1.68)	1.03 (0.63-1.67)
Low	1.25 (0.70-2.22)	1.24 (0.69-2.24)	1.26 (0.70-2.28)
Supervisors support (n=481)			
High	*Reference*		
Medium	1.05 (0.66-1.66)	1.05 (0.66-1.68)	1.06 (0.66-1.69)
Low	0.95 (0.53-1.68)	0.88 (0.49-1.59)	0.92 (0.51-1.65)
Workplace support (n=471)			
High	*Reference*		
Medium	1.19 (0.75-1.91)	1.24 (0.77-2.00)	1.22 (0.75-1.98)
Low	1.17 (0.65-2.10)	1.12 (0.61-2.04)	1.17 (0.64-2.14)
Overall perception of HSE management system (n=475) (HSMST)			
Favourable	*Reference*		
Unfavourable	0.80 (0.47-1.35)	0.80 (0.47-1.36)	0.84 (0.49-1.44)
Combined physical exposure (n=428)			
Low	*Reference*		
Moderate	**0.44 (0.25-0.77)**	**0.45 (0.25-0.80)**	**0.45 (0.25-0.80)**
High	**0.53 (0.31-0.89)**	**0.50 (0.29-0.86)**	**0.53 (0.30-0.92)**

Model I: Adjusted for age and gender **Model II**: Previous model + partner working

[1] Using the restricted sample of model II with no missing covariate data

Table 6.4 Work factors and the odds ratio of sickness absence of six statistical models[1]

Work factor	Unadjusted	Model I	Model II	Model III	Model IV	Fully adjusted
Job control (n=335)						
High	*Reference*					
Medium	1.05 (0.56-1.96)	1.13 (0.60-2.14)	1.09 (0.57-2.06)	1.28 (0.64-2.55)	1.23 (0.62-2.46)	1.08 (0.52-2.26)
Low	1.23 (0.67-2.24	1.22 (0.66-2.25)	1.25 (0.67-2.31)	1.27 (0.66-2.47)	1.26 (0.65-2.44)	1.29 (0.64-2.58)
Job demand (n=348)						
Low	*Reference*					
Medium	1.17 (0.63-2.16)	1.22 (0.66-2.28)	1.16 (0.62-2.18)	1.38 (0.70-2.72)	1.50 (0.75-2.99)	1.46 (0.71-2.99)
High	0.90 (0.47-1.69)	0.99 (0.52-1.88)	0.99 (0.52-1.90)	1.07 (0.53-1.90)	1.14 (0.56-2.32)	1.20 (0.57-2.52)
Psychological work classification (n=330)						
Relaxed	*Reference*					
Passive	1.40 (0.73-2.67)	1.48 (0.77-2.87)	1.04 (0.77-2.88)	1.71 (0.84-3.50)	1.78 (0.86-3.67)	1.79 (0.85-3.77)
Active	0.90 (0.40-2.05)	1.01 (0.43-2.33)	1.07 (0.46-2.49)	1.05 (0.43-2.54)	1.10 (0.45-2.67)	1.23 (0.48-3.14)
Strain	1.02 (0.47-2.19)	1.13 (0.51-2.47)	1.16 (0.53-2.55)	1.12 (0.48-2.57)	1.17 (0.50-2.71)	1.15 (0.48-2.75)
Co-workers support (n=348)						
High	*Reference*					
Medium	0.89 (0.52-1.53)	0.89 (0.51-1.55)	0.86 (0.49-1.56)	0.86 (0.48-1.54)	0.86 (0.48-1.55)	0.88 (0.48-1.63)
Low	1.15 (0.59-2.23)	1.12 (0.57-2.20)	1.11 (0.56-2.19)	0.93 (0.45-1.93)	0.96 (0.46-2.00)	1.19 (0.55-2.57)
Supervisors support (n=348)						
High	*Reference*					
Medium	1.12 (0.66-1.90)	1.15 (0.67-1.97)	1.11 (0.64-1.91)	1.27 (0.72-2.25)	1.31 (0.74-2.33)	0.79 (0.72-2.37)
Low	0.86 (0.45-1.66)	0.82 (0.42-1.61)	0.84 (0.43-1.64)	0.68 (0.32-1.42)	0.73 (0.34-1.54)	0.79 (0.37-1.71)
Workplace support (n=344)						
High	*Reference*					
Medium	1.13 (0.66-1.92)	1.17 (0.68-2.01)	1.11 (0.64-1.93)	1.23 (0.69-2.21)	1.25 (0.70-2.24)	1.28 (0.70-2.34)
Low	1.10 (0.51-1.98)	0.96 (0.47-1.91)	0.99 (0.50-1.97)	0.82 (0.39-1.74)	0.84 (0.39-1.79)	1.00 (0.45-2.18)
Overall perception of HSE management (n=349)						
Favourable	*Reference*					
Unfavourable	0.88 (0.49-1.57)	0.87 (0.48-1.57)	0.94 (0.51-1.72)	0.91 (0.48-1.71)	0.98 (0.52-1.85)	1.16 (0.60-2.20)
Combined physical exposure (n=344)						
Low	*Reference*					
Moderate	**0.45 (0.24-0.82)**	**0.46 (0.25-0.85)**	**0.46 (0.25-0.86)**	**0.42 (0.22-0.81)**	**0.43 (0.22-0.83)**	**0.43 (0.22-0.83)**
High	**0.38 (0.21-0.70)**	**0.37 (0.20-0.68)**	**0.38 (0.20-0.72)**	**0.33 (0.17-0.64)**	**0.33 (0.17-0.65)**	**0.33 (0.17-0.65)**

Model I: Adjusted for age and gender **Model II**: Previous model + partner working status **Model III**: Previous model + private life support, frequency of meeting friends, tragic events last 12 months, self-rated health, work ability, smoking shisha and presenteeism. **Model IV**: Previous model + dominant work gender **Fully adjusted**: previous model + noise, carrying heavy objects, standing and repetitive movement.

[1] Using the restricted sample of the fully adjusted model with no missing covariate data

6.3.3 Work factors and the risk of early retirement intention

Thirty-eight percent of respondents reported early retirement intentions (Table 6.5). Of the 253 police employees who intended to retire early, 239 gave their main reason for this (Table A 6.25). For 53% (127/239), this was to 'enjoy life and spend more time with partner' or because they were 'fed up with job and want a change (possibly another job)'. Less than 10% held this intention due to their 'own ill-health' or 'ill health of a relative/friend'.

In the unadjusted model, a statistically significant increase in the odds of early retirement intention was seen in police employees in the low versus high categories of all psychosocial work factors, apart from job demand which had a statistically non-significant protective effect. The increase in the odds of early retirement intention ranged from OR=1.74 (95%CI=1.14-2.16) in the low job control category to OR=3.01 (95%CI=1.92-4.72) in those reporting low workplace support (Table 6.5).

Statistically significant increases in the odds of early retirement intention by 55% and 85% were also seen in the medium versus high category of co-workers support and workplace support respectively. Participants with 'passive' psychological work status had a rise in the odds of early retirement intention compared with those in the 'relaxed' category (OR=1.59, 95%CI=1.01-2.51).

Significant increase in the odds of early retirement intention was seen in police employees with high (versus low) combined physical exposures (OR=2.29, 95%CI=1.52-3.44) (Table 6.5). Statistically significant increased odds of early retirement intentions were seen in participants who were exposed for at least half of their working time to any of six physical work factors: vibration, noise, working in painful positions, lifting people, working on screens and dealing with angry clients (Table A 6.13).

A twofold increase in the odds of early retirement intentions was seen in participants reporting unfavourable overall perception of the health and safety management system (HSMST) (Tables 6.5). For seven of the health and safety dimensions (excluding HSMS5), individuals with unfavourable perceptions also had significantly increased odds of early retirement intention (Table A 6.14).

Table 6.5 Overall distribution of work factors and early retirement intention

Work factor	n (%)	n with ERI data	Early retirement intention (ERI) No n (%)[2]	Yes n (%)	Odds Ratio[1] (95% CI)
Early Retirement Intention		663	410 (62)	253 (38)	
Job control					
High	202 (30)	173	121 (70)	52 (30)	1
Medium	230 (34)	211	137 (65)	74 (35)	1.25 (0.81-1.93)
Low	252 (37)	229	131 (57)	98 (43)	**1.74 (1.14-2.16)**
Total	*684 (100)*	*613*	*389 (63)*	*224 (37)*	
Job demand					
Low	221 (31)	190	116 (62)	74 (38)	1
Medium	265 (37)	224	149 (61)	95 (39)	0.95 (0.64-1.40)
High	238 (33)	209	139 (67)	70 (33)	0.75 (0.50-1.13)
Total	*724 (100)*	*643*	*404 (62)*	*239 (37)*	
Co-workers support					
High	250 (35)	213	153 (72)	60 (28)	1
Medium	317 (44)	293	182 (62)	111 (38)	**1.55 (1.06-2.27)**
Low	153 (21)	136	64 (47)	36 (53)	**2.95 (1.88-4.63)**
Total	*720 (100)*	*642*	*399 (62)*	*243 (38)*	
Supervisors support					
High	281 (38)	244	171 (70)	73 (23)	1
Medium	284 (39)	262	163 (62)	99 (38)	1.42 (0.98-2.06)
Low	168 (23)	144	68 (47)	76 (53)	**2.61 (1.70-4.01)**
Total	*733 (100)*	*650*	*402 (62)*	*248 (38)*	
Workplace support					
High	265 (37)	230	168 (73)	62 (27)	1
Medium	295 (41)	273	162 (59)	111 (41)	**1.85 (1.27-2.71)**
Low	152 (21)	131	62 (47)	69 (53)	**3.01 (1.92-4.72)**
Total	*712 (100)*	*634*	*392 (62)*	*242 (38)*	
Psychological work classification					
Relaxed	135 (20)	122	85 (70)	37 (30)	1
Passive	302 (45)	273	161 (59)	112 (41)	**1.59 (1.01-2.51)**
Active	117 (18)	96	71 (74)	25 (26)	0.80 (0.44-1.46)
Strain	114 (17)	107	66 (62)	41 (38)	1.42 (0.82-2.46)
Total	*668 (100)*	*598*	*383 (64)*	*215 (36)*	
Overall perception of HSE management system (HSMST)					
Favourable	561 (78)	498	328 (66)	170 (34)	1
Unfavourable	175 (22)	144	70 (49)	74 (51)	**2.03 (1.40-2.96)**
Total	*718 (100)*	*642*	*398 (62)*	*244 (38)*	
Combined physical exposure					
Low	233 (37)	217	153 (71)	64 (29)	1
Moderate	188 (30)	166	105 (63)	61 (37)	1.38 (0.90-2.13)
High	215 (34)	192	98 (51)	94 (49)	**2.29 (1.52-3.44)**
Total	*636 (100)*	*575*	*356 (62)*	*219 (38)*	

[1]Unadjusted odds ratio of reporting intention for retiring early compared with those without such intention

[2] Row percentages.

Adjustment models

Table 6.6 shows the odds ratio of the association between work factors and the risk of early retirement intention in three models. Education, marital status and years of service were also associated with early retirement intention (Table A 6.15) and were included in model II.

There was a statistically significant increase in odds of early retirement intention in the three models in the low (versus high) categories of the three social support variables and those with unfavourable (versus favourable) perception of health and safety management system. The adjustment did not make large difference in the associations. The odds of early retirement intention in police employees with high (versus low) combined physical exposures increased significantly by 66%, 90% and 92% in the unadjusted, model I and model II respectively.

Participants with low and medium (versus high) job control had a statistically non-significant increase in odds of early retirement intention in all three models. Similar non-significant associations in the three models were seen in those with medium and high (versus low) job demand. Compared with those in the 'relaxed' psychological work status (reference group), police employees in the 'passive' and 'strain' categories had a statistically non-significant raise in the odds of early retirement intention in all three models with an increase of 33% and 44% in model II respectively while those in the 'active' job category had a non-significant protective effect in the three models.

Table A 6.22 indicated that when using the restricted sample of model II, three out of nine physical work factors; vibration, working in painful position and dealing with angry clients resulted in a statistically significant increase in early retirement intention in the unadjusted model in those exposed half of time or more (versus less than half of time) by 66%, 58% and 49% respectively. These factors remained significant in model I and II with noise and lifting people also becoming statistically significant in the same direction. Officers with

unfavourable (versus favourable) perception of four health and safety dimensions (HSMS1, 4, 6 &7) (Table A 6.23) had a rise in the odds of early retirement intention in the unadjusted model which remained significant in model I and II only for one dimension (HSMS4) (model II OR=1.75, 95% CI=1.16-2.65).

Table 6.6 Work factors and the odds ratio of early retirement intention in three statistical models[1].

Work factor	Unadjusted	Model I	Model II
Job control (n=523)			
High	*Reference*		
Medium	1.33 (0.84-2.12)	1.45 (0.90-2.32)	1.49 (0.92-2.41)
Low	1.45 (0.92-2.28)	1.50 (0.94-2.39)	1.55 (0.97-2.49)
Job demand (n=536)			
Low	*Reference*		
Medium	1.09 (0.69-1.71)	1.17 (0.74-1.87)	1.22 (0.76-1.96)
High	0.99 (0.62-1.58)	1.03 (0.64-1.67)	0.96 (0.58-1.56)
Psychological work classification (n=511)			
Relaxed	*Reference*		
Passive	1.26 (0.77-2.07)	1.37 (0.83-2.27)	1.33 (0.80-2.21)
Active	0.71 (0.37-1.34)	0.72 (0.37-1.38)	0.61 (0.31-1.19)
Strain	1.48 (0.83-2.63)	1.57 (0.87-2.82)	1.44 (0.79-2.63)
Co-workers' support (n=538)			
High	*Reference*		
Medium	1.43 (0.95-2.17)	1.39 (0.91-2.13)	1.45 (0.94-2.23)
Low	**2.32 (1.40-3.80)**	**2.29 (1.37-3.82)**	**2.53 (1.48-4.30)**
Supervisors' support (n=543)			
High	*Reference*		
Medium	1.49 (0.99-2.23)	1.45 (0.96-2.20)	1.56 (0.99-2.39)
Low	**2.14 (1.32-3.48)**	**2.17 (1.33-3.57)**	**2.35 (1.41-3.92)**
Workplace support (n=533)			
High	*Reference*		
Medium	**1.91 (1.27-2.28)**	**1.83 (1.20-2.78)**	**1.88 (1.22-2.89)**
Low	**2.25 (1.35-3.76)**	**2.26 (1.34-3.80)**	**2.47 (1.44-4.22)**
Overall perception of HSE management (n=536) (HSMST)			
Favourable	*Reference*		
Unfavourable	**1.78 (1.16-2.71)**	**1.66 (1.08-2.55)**	**1.67 (1.08-2.59)**
Combined physical exposure (n=483)			
Low	*Reference*		
Moderate	1.39 (0.87-2.20)	1.38 (0.86-2.22)	1.39 (0.85-2.25)
High	**1.66 (1.05-2.61)**	**1.90 (1.18-3.03)**	**1.92 (1.18-3.11)**

Model I: Adjusted for age and gender **Model II**: Previous model + education, marital status and years of service.

[1] Using the restricted sample of model II with no missing covariate data

Using the restricted sample of the fully adjusted model (Table 6.7), the influence of work factors on the odds of early retirement intention was similar to that seen in the unadjusted model (Tables 6.5). A comparison between the influence of work factors on the odds of early retirement intention in the unadjusted model and model I in the full sample and the restricted sample of the fully adjusted model is shown on Table A 6.24.

In general, two main differences were noticed. First, participants with low (versus high) job control, medium (versus high) co-workers' support, 'passive' compared with 'relaxed' psychological work status and high (versus low) combined physical exposures had a significant increase in the odds of early retirement intention in the full sample (Table 6.5) which remained increased but with no statistical significance in the sample of the fully adjusted model (Table 6.7). This was also seen in participants with low (versus high) job control in model I (Table A 6.24).

Secondly, police employees with high (versus low) job demand had a non-significant protective effect of early retirement intention in the unadjusted model and model I in the full police sample. In contrast, the association was non-significant in the opposite direction in the restricted sample of the fully adjusted model. (Table A 6.24).

The odds of early retirement intention remained statistically significant in all models only in police employees with medium (versus high) workplace support. A marked but non-significant increase in the odds of early retirement intention was seen in model III for participants with medium (versus high) co-workers' support (49%) and medium (versus low) job demand (36%). In participants in the low (versus high) categories of the three support variables and those with unfavourable (versus favourable) overall perception of the health and safety management system (HSMST), the statistically significant increase in the odds of early retirement intention decreased between the unadjusted model to model II and became raised non-significantly from model III (Table 6.7).

Table 6.7 Work factors the odds ratio of early retirement intentions (ERI) in six statistical models[1].

Work factor	Unadjusted	Model I	Model II	Model III	Model IV	Fully adjusted
Job control (n=319)						
High	*Reference*					
Medium	1.03 (0.56-1.89)	1.00 (0.54-1.85)	1.03 (0.55-1.93)	1.11 (0.51-2.41)	1.29 (0.58-2.88)	0.92 (0.37-2.29)
Low	1.54 (0.88-2.72)	1.45 (0.82-2.59)	1.50 (0.84-2.70)	1.22 (0.59-2.54)	1.35 (0.62-2.93)	1.42 (0.59-3.42)
Job demand (n=328)						
Low	*Reference*					
Medium	1.31 (0.71-2.31)	1.35 (0.73-2.52)	1.43 (0.75-2.72)	1.79 (0.83-3.87)	1.81 (0.81-4.00)	1.70 (0.70-4.13)
High	1.06 (0.58-1.95)	1.09 (0.58-2.06)	0.99 (0.52-1.88)	0.94 (0.43-2.04)	0.92 (0.41-2.04)	0.91 (0.38-2.21)
Psychological work classification (n=315)						
Relaxed	*Reference*					
Passive	1.29 (0.69-2.41)	1.31 (0.69-2.49)	1.38 (0.72-2.61)	1.23 (0.56-2.71)	1.57 (0.68-3.63)	1.37 (0.54-3.50)
Active	0.74 (0.34-1.62)	0.77 (0.34-1.71)	0.69 (0.30-1.58)	0.49 (0.18-1.35)	0.55 (0.20-1.53)	0.48 (0.15-1.52)
Strain	1.43 (0.70-2.91)	1.44 (0.69-3.01)	1.29 (0.61-2.73)	1.04 (0.42-2.57)	1.16 (0.46-2.91)	1.23 (0.43-3.46)
Co-workers support (n=315)						
High	*Reference*					
Medium	1.65 (0.96-2.86)	1.44 (0.82-2.53)	1.46 (0.82-2.60)	1.95 (0.95-4.02)	2.21 (0.98-4.68)	2.17 (0.88-5.32)
Low	**2.76 (1.38-5.17)**	**2.32 (1.18-4.56)**	**2.50 (1.23-5.07)**	1.60 (0.66-3.87)	1.72 (0.70-4.26)	1.86 (0.62-5.53)
Supervisors support (n=315)						
High	*Reference*					
Medium	1.69 (0.99-2.90)	1.57 (0.90-2.72)	1.65 (0.93-2.92)	1.65 (0.80-3.39)	1.67 (0.79-3.53)	1.19 (0.48-2.93)
Low	**2.14 (1.14 -4.01)**	**2.10 (1.11-3.97)**	**2.16 (1.11-4.18)**	0.97 (0.41-2.27)	0.92 (0.38-2.22)	0.55 (0.19-1.60)

Model I: Adjusted for age and gender **Model II**: Previous model + education, marital status and years of service **Model III**: Previous model + number of children, work life imbalance, private life support frequency of meeting friends, tragic events, self-rated health, work ability, presenteeism, BMI category, smoking status and exercise. **Model IV**: Previous model + work hours and transportation time to work. **Fully adjusted**: previous model + control, demand, support, vibration, noise, working in painful position, lifting, working on screens, dealing with angry clients and all factors relating to perceptions of occupational health and safety management systems.

[1] Using the restricted sample of the fully adjusted model with no missing covariate data.

Table 6.7 continued

Work factor	Unadjusted	Model I	Model II	Model III	Model IV	Fully adjusted
Workplace support (n=315)						
High	*Reference*					
Medium	**2.20 (1.28-3.80)**	**1.94 (1.11-3.39)**	**1.97 (1.11-3.49)**	**2.21 (1.06-4.62)**	**2.19 (1.02-4.69)**	**2.42 (1.01-5.87)**
Low	**3.52 (1.30-4.88)**	**2.35 (1.20-4.60)**	**2.49 (1.25-4.98)**	1.17 (0.47-2.86)	1.15 (0.46-2.88)	1.00 (0.35-2.85)
Overall perception of HSE management (n=313)						
Favourable	*Reference*					
Unfavourable	**2.05 (1.20-3.49)**	**1.84 (1.07-3.19)**	**1.82 (1.04-3.17)**	1.30 (0.65-2.59)	1.19 (0.57-2.46)	1.43 (0.61-3.34)
Combined physical exposure (n=315)						
Low	*Reference*					
Moderate	1.62 (0.91-2.85)	1.58 (0.88-2.85)	1.70 (0.94-3.09)	1.60 (0.78-3.27)	1.79 (0.85-3.78)	1.97 (0.88-4.40)
High	1.48 (0.84-2.60)	1.68 (0.94-3.00)	1.78 (0.97-3.24)	1.50 (0.70-3.19)	1.53 (0.70-3.33)	1.81 (0.76-4.28)

Model I: Adjusted for age and gender **Model II**: Previous model + education, marital status and years of service **Model III**: Previous model + number of children, work life imbalance, private life support, frequency of meeting friends, tragic events, self-rated health, work ability, presenteeism, BMI category, smoking status and exercise. **Model IV**: Previous model + work hours and transportation time to work. **Fully adjusted**: previous model + control, demand, support, vibration, noise, working in painful position, lifting, working on screens, dealing with angry clients and all factors relating to perceptions of occupational health and safety management systems.

[1] Using the restricted sample of the fully adjusted model with no missing covariate data.

6.3.4 The relationship between sickness absence and early retirement intentions

Participants who reported ≥4d of sickness absence in the past 12 months were more likely to intend to retire early (Table 6.8). A statistically significant increase in the odds of early retirement were seen only in participants reporting ≥4d of sickness absence (OR=1.79, 95%CI=1.22-2.63) compared with the reference group (0d). Individuals reporting 1-3d had a non-significant increase (OR=1.37, 95%CI=0.92-2.02).

The unadjusted odds ratios using the restricted sample of model II (Table 6.9) and the sample fully adjusted model (Table 6.10) for police employees with ≥4d of sickness absence were similar to that seen in the full sample (Table 6.8). The results for models I and II in Tables 6.9 & 6.10 were also similar, although not statistically significant when using the restricted sample of the fully adjusted model.

Table 6.8 Sickness absence durations in the last 12 months and early retirement intention (full sample)

			Early retirement intention (ERI)		
Factor	**n (%)**	**n with ERI data**	**No n (%)[2]**	**Yes n (%)**	**Odds Ratio[1] (95% CI)**
Full sample		663	410 (62)	253 (38)	
Sickness absence					
0d	340 (51)	327	220 (67)	107 (33)	1
1-3d	161 (24)	160	96 (60)	64 (40)	1.37 (0.92-2.02)
≥4d[3]	169 (25)	165	88 (53)	77 (47)	**1.79 (1.22-2.63)**
Total	*670 (100)*	*652*	*404 (62)*	*248 (38)*	

[1]Unadjusted odds ratio of reporting intention for retiring early compared with those without such intention

[2] Row Percentages

[3] Categories 4-7d and ≥8d were combined due to small sample of the latter category (10%)

Table 6.9 Sickness absence durations in the last 12 months and the odds ratio of early retirement in three statistical models[1]

Factor	**Unadjusted**	**Model I**	**Model II**
Sickness absence (n=547)			
0d	*Reference*		
1-3d	1.18 (0.76-1.84)	1.39 (0.88-2.18)	1.41 (0.89-2.25)
≥4d	**1.82 (1.19-2.79)**	**1.90 (1.22-2.95)**	**1.89 (1.20-2.97)**

Model I: Adjusted for age and gender **Model II**: Model I + education, marital status and years of service

[1] Using the restricted sample of model II with no missing covariate data

Table 6.10 Sickness absence durations in the last 12 months and the odds ratio of early retirement in six statistical models[1].

Work factor	Unadjusted	Model I	Model II	Model III	Model IV	Fully adjusted
Sickness absence (n=316)						
0d	*Reference*					
1-3d	0.98 (0.55-1.74)	1.06 (0.59-1.92)	1.07 (0.58-1.95)	0.96 (0.47-2.00)	0.92 (0.43-1.96)	0.89 (0.38-3.10)
≥4d	**1.81 (1.04-3.17)**	1.76 (0.99-3.12)	1.70 (0.94-3.04)	1.61 (0.80-3.22)	1.65 (0.80-3.39)	1.74 (0.76-3.99)

Model I: Adjusted for age and gender **Model II**: Previous model + education, marital status and years of service **Model III**: Previous model + number of children, work life imbalance, private life support, frequency of meeting friends, tragic events, self-rated health, work ability, presenteeism, BMI category, smoking status and exercise. **Model IV**: Previous model + work hours and transportation time to work. **Fully adjusted**: previous model + control, demand, support, vibration, noise, working in painful position, lifting, working on screens, dealing with angry clients and all factors relating to perceptions of occupational health and safety management systems. [1] Using the restricted sample of the fully adjusted model with no missing covariate data.

6.3.5 Summary of findings

This study evaluated the influence of psychosocial work factors, physical work factors and employees' perception of organisational health and safety management system on the risk of sickness absence and early retirement intentions. The study also evaluated the relationship between self-reported sickness absence and early retirement intention.

The Occupational Health and Safety Survey was distributed to 1,317 officers of the Capital Police Directorate of Abu Dhabi Police between Feb 1st and March 31st 2015 (Total number of employees 1,425 of which 108 were surveyed in the pilot study and excluded from the main study). The survey was completed by 760 employees (58%). The risk (odds) of having sickness absence of four days or more (≥4d) compared with 0 to 3 days (0-3d) and the risk of holding early retirement intention compared with not intending to retire early were estimated using logistic regression.

In this police sample 51% had no days while 36% ≥ 4d of sickness absence. Thirty-eight percent of participants reported intentions to retire early. Psychosocial work factors and perceptions of health and safety management systems were not significant predictors of sickness absence in this police sample. Surprisingly, officers who reported high combined physical exposures (compared with those reporting low) had a significantly protective effect from sickness absence after adjusting for all covariates.

Low job control resulted in a significant increase in the risk of early retirement intentions in the unadjusted model of the full sample. However, the relationship became raised non-significantly when the restricted sample of model II or the fully adjusted model sample were used. Job demand, strain and workplace support were not significant predictors of early retirement intentions.

Officers reporting unfavourable overall perception of health and safety management system had a significant increase in the risk of early retirement intentions. This relationship became non-significant after adjusting for social, health and lifestyle factors. Officers with high combined physical exposures also had a significant increase in the risk of early retirement intention and the relationship also became non-significant after adding various adjustments and using the restricted sample of the fully adjusted model.

Finally, using the full sample of this study, there was a significant increase in the risk of early retirement intention in officers with ≥4d of sickness absence (compared with those reporting no sickness absence days). The association remained significant when using the restricted sample of model II in the unadjusted model as well as after adjusting for age, gender and other demographic covariates. However, when the restricted sample of the fully adjusted model was used, the risk of early retirement intention increased significantly in officers reporting ≥4d of sickness absence only in the unadjusted model.

6.4 Discussion

This study aimed to evaluate the influence of work factors on self-reported sickness absence and early retirement intention. The study also investigated the potential use of self-reported sickness absence in the prediction of early retirement intention.

The response rate in this study was 58%, which is similar to that of previous health-related studies (particularly sickness absence) in the police such as Berg et al. (2006), Brown et al. (1995) and Tang & Hommontree (1992), where the response rates were 51%, 60%, and 61% respectively.

The risk of sickness absence in this study refers to the risk of reporting ≥4d compared with 0-3d of sickness absence. In general, the study found no association between psychosocial work factors (job control, demand and workplace support) and employees' perception of health and

safety management system and the risk of sickness absence. This was seen both with and without adjusting for age, gender and other work and non-work covariates. A significant decrease in risk of sickness absence was seen in officers reporting moderate or high (compared with low) combined physical exposures, after adjusting for all covariates.

This study also showed that low workplace support, holding unfavourable overall perception of health and safety management system and reporting high combined physical work exposures increased the risk of holding early retirement intentions in the police. However, the associations became non-significant after adjusting for social, health and lifestyle factors.

Officers reporting ≥4d of sickness absence within the last 12 months had an increased risk of holding early retirement intention. A similar magnitude of association was observed after adjusting for all factors, although this association was no longer statistically significant.

6.4.1 Sickness absence

Psychosocial work factors and the risk of sickness absence

This study found no association between job control and the risk of sickness absence, in contrast to findings from other studies. Niedhammer et al. (2012) and Lesuffleur et al. (2014) found low job control to result in a significant increase in the risk of sickness absence respectively for males (OR=1.35, 95%CI=1.23-1.46 and OR=2.26, 1.90-2.68) and for females (OR=1.20, 1.11-1.30 and OR=1.97, 1.67-2.32). Other studies have supported this inverse relationship (Blank et al., 1995; Niedhammer et al., 1998; Kivimaki et al., 1997).

There was also no association between psychological job demand and the risk of sickness absence in this study. Previous studies which evaluated this relationship showed mixed results. An increase in risk of sickness absence with high job demand by 21% (Vahtera et al., 2000) and 34% for males and 48% for females (Niedhammer et al., 2012) have been reported which was also supported by other scholars (Kivimaki et al., 1997; Lesuffleur et al., 2014);

Kristensen, 1991). In the British Whitehall Study, male employees with high job demand had a protective effect from short (OR=0.75, 0.69-0.80) and long term (OR=0.76, 0.64-0.90) sickness absence (North et al., 1996) while other studies showed a non-significant association (Voss et al., 2001; De Jonge et al., 2000; Houtman et al., 1994).

Officers who fit the 'job strain' category did not have a significant increase in the risk of sickness absence in this study. This contradicts with the majority of previous studies that showed increases in the risks of the frequency and the duration of sickness absenteeism (Moreau et al., 2004; Niedhammer et al., 1998; Virtanen et al., 2007; Nielsen et al., 2006). In their meta-analysis, Duijts et al. (2007) found that job strain results in a significant 20% and 48% increase in both short term (3 days or less) and long term sickness absence respectively.

This study also found no association between support at work and the risk of sickness absence, which concurs with some studies (Kivimaki et al., 1997 & 2000; Bourbonnais & Mondor, 2001) and disagrees with other studies that showed that support is a significant predictor of sickness absences (high support reduced sickness absence) (North et al., 1993; Unden, 1996; Vahtera et al., 1996 & 2000).

Literature on the influence of work factors on the risk of sickness absence in the police force is limited in quantity (Körlin et al., 2009; Svedberg & Alexanderson, 2012). In Chapter Two of this thesis, it was noted that only one study (Magnavita & Garbarino, 2013) investigated the impact of psychosocial work factors on sickness absence in the police force. This Italian study also found non-significant associations between job control, job demand and workplace support and the risk of sickness absence. Thus, the lack of association could be attributed to factors relating to the policing job itself.

For example, research has shown that when compared with psychosocial and physical work stressors, administrative/professional pressures are the most frequent work stressors reported

by police officers. Police stress resulting from administrative/professional pressures is not only the result of low job control but can also be captured by the criticism of the police by the public, imbalance between effort and reward and work and family conflicts (Claudia et al., 2015; Berg et al., 2005). In addition, previous studies have also shown that police officers are more resilient to stress than civilians (Evans et al., 2013; Yuan et al., 2011; Garbarino et al., 2012), which could explain the lack of association between psychological job factors and sickness absence.

The male-dominated hierarchal semi-military structure of law enforcement agencies is an inherent culture that makes it difficult for police employees to admit the existence of problems and discourages officers from seeking help. In this organisational structure, police officers are trained to withstand stress by controlling emotions and solving their problems and that of others while on duty (Ganster et al., 1996; Berg et al., 2006). Finally, investigating stress (job strain in the current study) in police employees is generally difficult as they may be afraid that they can be identified as individuals with stress, which may result in termination from work or re-allocation (Garbarino et al., 2013).

The differences in findings with respect to the influence of psychological work factors and risk of sickness absence between the current study and previous studies could also be attributed to differences in the use of sickness absence measures or how the risk of sickness absence was measured (Vaananen et al., 2003; Niedhammer et al., 1998; Roelen et al., 2007) and the stratification of results by socio-demographic factors such as gender (Vaananen et al., 2003; Ala-Mursala et al., 2002) and socioeconomic status (Virtanen et al., 2007). For instance, Roelen et al. (2007) found that high psychological job demand increases the risk of long term sickness absence (>7 days) but not shorter periods of sickness absence. Kivimaki et al. (1997) also found similar non-significant associations in employees in the public sector.

This could reflect other complex organisational processes factors not covered in this study such as social network and organisational norms (Xie & Johns, 2000).

In the current study, only 9% of police employees who reported their gender were female. Thus, investigating the association between psychological work factors and the risk of sickness absence in males and females separately was not feasible. Gender stratified analyses could have provided reasons for lack of association between psychosocial work factors and sickness absence (Vaananen et al., 2003; North et al., 1996; Voss et al., 2001).

Finally, sickness absence could have been influenced by sources of support for police employees other than those examined in this study, such as non-police friends, departmental support and support from the public (Claudia et al., 2015; Spielberger et al., 1981).

Overall perception of health and safety management system, physical work exposures and the risk of sickness absence

It can be argued that employees' perception of health and safety management system may influence sickness absence indirectly. Holding unfavourable perceptions of the health and safety management system may reduce employees' job satisfaction which has been shown to increase the risk the sickness absence (Bockerman & IImakunnas, 2008; Borgogni et al., 2013). In the current study, however, officers with an unfavourable overall perception of the health and safety management system had a non-significant protective effect from sickness absence which remained non-significant but with an increased in the risk after adjusting for all covariates.

Reasons behind this lack of association are unclear and comparison with other studies is difficult due to the lack of studies on this relationship. It can be argued that employees could be highly satisfied about certain aspects of the job (such as salary) which may reduce the

influence of holding unfavourable perception of health and safety management system on the risk of sickness absence.

In this study, officers reporting high combined physical exposures had a significantly protective effect from sickness absence after adjusting for all covariates. Adverse physical working conditions could cause occupational stress (de Croon et al., 2003) which in turn, may increase sickness absenteeism (Johnson et al., 1996; Virtanen et al., 2007). However, it is unclear why the relationship was significant in the unexpected direction. Adverse physical working conditions may reduce one's job satisfaction (Bockerman & Ilmakunnas, 2008) which has been shown to increase sickness absence (Brown & Sessions, 1996; Clegg, 1983). Thus, it can be argued that police employees reporting unfavourable working conditions might have still been satisfied with their job and hence, had a protective effect from sickness absence.

The unexpected relationship could also result from employees' overstating or exaggeration of their exposure to physical work hazards, a problem also noted by Bockerman & Ilmakunnas (2008). In their analysis of predictors of sickness absence, Allebeck and Mastekaasa (2004) stated that evidence on the influence of physical working conditions on sickness absence are 'limited' and that studies were not consistent in their use of self-reported measures of physical work environment. Therefore, it is difficult to compare findings of the current study with previous literature.

6.4.2 Early retirement intention

Psychosocial work factors and the risk of early retirement intention

In this study, there was an increase in the risk of early retirement intention in employees with low control in the unadjusted model of the full sample. This relationship became non-significantly raised using the restricted sample of model II or the fully adjusted model.

Heponiemi et al. (2008) found low job control to result in an increase in early retirement thoughts (OR=1.71, 1.50-1.95). Other studies have also supported this inverse relationship (Blekesaune & Solem, 2005; Elovainio et al., 2005; Sutinen et al., 2005).

Elovainio et al. (2005) and Harkonmaki et al. (2006A) showed that the risk of early retirement intention increases in individuals with high job demand (OR=1.41, 1.29-1.54 and OR=2.70, 2.00-3.65 respectively). Other scholars have supported this relationship (Blekesaune & Solem, 2005; Siegrist et al., 2007). This study, however, showed a non-significant increase in the risk of early retirement intention in those with high demand which is in line with few studies (Fernández-Castro et al., 2015; Sejbaek et al., 2013).

This study showed no association between job strain and early retirement intentions, which is in line with the findings of another study (Schreurs et al., 2011). As with other studies (Han et al., 2015; Elovainio et al., 2003 & 2005), this study also found an increase in the risk of early retirement intention in employees with low workplace support. This relationship remained raised but non-significant after adjusting for social, health and lifestyle factors.

Low job control is associated with poor physical and psychological health (Elovainio et al., 2002), reduces working ability (Gimeno et al., 2005) and strengthens the association between health problems and early retirement intention (Heponiemi et al., 2008). This may explain the high risk of early retirement intention in individuals with low job control in the unadjusted model of the full sample. Job control became a non-significant predictor of early retirement intention when using the restricted sample of model II or the fully adjusted model. This could be attributed to the relatively small sample size. Carrying out the analyses stratified by gender might provide more insights into reasons for this lack of association, as the influence of psychological factors may differ in males and females (Vaananen et al., 2003).

The lack of association between job demand, job strain and early retirement intention in this study could be attributed to the male-dominated policing occupation (discussed above) and the greater readiness of officer to withstand stress when compared with civilians (Evans et al., 2013; Yuan et al., 2011; Garbarino et al., 2012). Other factors that have also been closely linked to early retirement intentions, such as affective organisational commitment (Boumans et al., 2008; Siegrist et al., 2007) and job satisfaction (Topa et al., 2009; Han et al., 2015), may explain this lack of association. These variables were not included in the current study. Police employees with high job demand or job strain may also perceive high affective organisational commitment and meaning of work which has been shown to mediate the influence of psychosocial work factors on early retirement intention (Clausen & Borg, 2010). These officers may also have high job satisfaction, which generally reduce early retirement thoughts (Han et al., 2015).

Social support at work has a buffering influence on occupational stress, protecting workers from the pathological consequences of stressful experiences. This is known as the stress-buffering hypothesis (House et al., 1988; Parkes et al., 1994). Therefore, police officers with low social workplace support could be more prone to negative health outcomes (Habersaat et al., 2015; Arial et al., 2010) which in turn, may encourage early retirement thoughts.

Officers often are reluctant to seek help from health professionals (Berg et al., 2006) and may not share concerns with supervisors or colleagues as they may fear that this would result in discrimination against them at work (Garbarino et al., 2013). Thus, officers tend to express their work stress to people outside the organisation (Habersaat et al., 2015). In the current study, private life support and frequency of meeting friends were significant predictors of early retirement intention. Therefore, the lack of association between social support at work and early retirement intention when these factors were added could be attributed to the strong

influence of non-work social support on shaping employees' decision for early exit from paid employment.

Overall perception of health and safety management system, physical work exposures and the risk of early retirement intention

In this police sample, higher risk of early retirement intention was reported by officers with unfavourable overall perception of the health and safety management system (HSMST). Officers who have unfavourable perception of organisational health and safety management system may believe that the organisation is mainly interested in achieving its objectives without considering staff health and safety needs. Public employees are generally more risk averse than private employees (Buurman et al., 2012).

Thus, police employees, who are involved in intrinsically hazardous tasks (Nirkko et al., 1982; Soininen, 1995), may require and expect to receive higher organisational health and safety support. If this is not delivered, it may can be that officer would be more likely to hold early retirement intentions.

The association between employees' perception of health and safety management and the risk of early retirement intention remained increased but with no statistical significance when social, health and lifestyle factors were added to the model. It can be argued that social life factors such as high private life support may reduce the influence of holding unfavourable perception of health and safety management on the risk of early retirement intention.

Finally, officers with high combined physical exposures had a significant increase in the risk of early retirement intention. Physically straining jobs have been shown to increase the risk of early retirement intention (Sejbaek et al., 2012; Bockerman & Ilmakunnas, 2008). Exposure to adverse physical work factors may results in health problems, in particular musculoskeletal diseases (Karpansalo et al., 2002), which may encourage early retirement thoughts. It can be

argued that as employees become older, their ability to withstand physical strain at work reduces which may encourage early retirement thoughts. Adverse working conditions may also reduce one's satisfaction with the job (Bockerman & Ilmakunnas, 2008) which in turn, has been linked to increasing the risk of holding early retirement intention (Topa et al., 2009; Han et al., 2015).

The relationship became increased non-significantly with little changes in the odds ratio in after adding various adjustments and using the restricted sample of the fully adjusted model. This could be attributed to the small sample size used in the evaluation of the relationship.

6.4.3 The association between sickness absence and early retirement intention

In the full sample of this study, there was a significant increase in the risk of early retirement intention in officers with ≥4d of sickness absence compared with those reporting no sickness absence days in the last 12 months. The association remained significant when using the restricted sample of model II and after adjusting for age, gender and other demographic covariates. This is in line with the findings of the only study that evaluated this relationship (Heponiemi et al., 2008). However, the latter study used a self-reported binary measure of sickness absence (Yes/No) while the current study included various sickness absence durations.

Sickness absence is negatively associated with job satisfaction (Roelen et al., 2008; Marmot et al., 1995) which was also associated with early retirement intentions (Mein et al., 2000; Lichtenstein, 1984; Sibbald et al., 2003). Thus, police officers with various sickness absence durations could have been dissatisfied about their work which in turn, may explain the increase in risk of holding early retirement intentions.

Evaluating other closely related factors such as organisational injustice and job control may also provide more insights into the relationship between sickness absence and early

retirement intention (Elovainio et al., 2005; Heponiemi et al., 2008). For example, Heponiemi et al. (2008) found that organisational injustice strengthens the association between sickness absence and early retirement intentions. Unfortunately, this variable was not included in the survey. It can also be argued that officers may take ≥4d of sickness absence as a coping strategy to deal with their stressful working environment or dissatisfying jobs. Job satisfaction is a significant predictor of early retirement intentions (Topa et al., 2009; Han et al., 2015).

Using the restricted sample of the fully adjusted model, the risk of early retirement intention increased significantly in officers reporting ≥4d of sickness absence only in the unadjusted model. It increased but not significantly after adjusting for age and gender. This could be attributed to the strong influence of demographic variables, age in particular, on early retirement intention. This mainly include age and years of service which are also associated with sickness absence (analysis not shown). Older officers in this sample were more likely to take long rather than short durations of sickness absence. For example, 14% and 8% of those between 40 and 49 years of age took ≥8d and 1-3d of sickness absence respectively compared with 8% and 24% respectively for officers between 30 and 39.

6.4.4 Strengths and limitations

This study bridges the gap in the literature regarding work predictors of sickness absence and early retirement intentions in the police force. Another strength of this study is that it is one of the first to evaluate the influence of employees' perception of organisational health and safety management system on the risk of sickness absence and early retirement intention. The study has a high response rate and is also one of very few to investigate the use of sickness absence data in the prediction of early retirement intention. As this study was carried out in one of the largest organisations in the UAE, the findings of the study could be compared with future occupational health research in the Middle East.

There are four main limitations of this study. This study used self-reported measures which are subject to recall bias as in other similar studies (McGhee et al., 2000; Berg et al., 2006; Burk and Mikkelsen, 2005). The cross-sectional design of the study makes it difficult to establish causal inference: if the exposure to work factors led to the outcome or the relationship exist in the opposite direction (Kirkwood & Sterne, 2003). Missing data was another limitation of this study. It resulted in reducing the sample size to almost half when adjusting for various covariate groups. Finally, females were under-represented in this sample of police officers which made it difficult to carry out stratified analyses of results.

Chapter 7: Discussion and conclusions

This chapter provides a general discussion regarding the findings of this thesis. The discussion is based on the two main aims of the thesis. This chapter also provides recommendations for future research and practice in general and in the police specifically.

7.1 Aim one: evaluating the relationship between sickness absence and the risk of disability retirement or early retirement intention

The second systematic review in Chapter Two concluded that sickness absence predicted disability retirement. The relationship was primarily evaluated using the number of days of sickness absence while other sickness absence measures, such as the average length of sickness absence spells and number of sickness absence spells, were used less frequently.

Denominator data would have been required to evaluate the association between sickness absence and the risk of disability retirement using a cohort design (adopted by the majority of previous studies). This was not granted by the Abu Dhabi Police and hence, the relationship was examined using a case-control design (Chapter Four). For this study, sickness absence data for cases and control for two years prior to granting disability retirement was obtained from an electronic register.

At baseline (adjusting for age, gender and work Administration), all three sickness absence measures over the two year exposure period (the total number of sickness absence spells, the total number of days of sickness absence and the average length of sickness absence spells) were significant predictors of disability retirement. These findings therefore, agree with the first hypothesis (H_1). This research also showed a graded increase in the risk of disability retirement with the increase in the duration of the sickness absence spell (>4 weeks, followed by 8-28d and 4-7d). Therefore, the findings of this research are also in line with the second hypothesis (H_2).

For the two year exposure period, significant increases in the risk of disability retirement of 17% and 18% were seen per extra 10 days of sickness absence and per extra spell of sickness absence respectively. The degree of association with disability was similar for these two measures. It was hypothesised (H_3) that the number of days of sickness absence would have a stronger influence on disability retirement than the number of sickness absence spells. However, the findings of this research offer no support for this hypothesis.

Long term sickness absence could be associated with long standing illnesses that reduce working ability of police employees. Frequency of sickness absence is one of the criteria used by the Abu Dhabi Police during the evaluation of disability retirement cases. Therefore, it is not surprising that officers with long term sickness absence had highest risk of disability retirement.

The exposure period in this research was only two years and controls were selected according to age range and gender of the disability retirement cases two years prior to disability retirement. It is generally normal practice to transfer employees who have increased sickness absence to Administrations with little hazardous work exposures, so only fitter and more resilient employees remain in a department undertaking highly strenuous work tasks. Thus, cases of disability retirement may have been shifted to Administrations with little occupational exposures a couple of years prior to retirement. Therefore, relationships between sickness absence and disability retirement between cases and controls could have been exaggerated in this research.

The results remained statistically significant even after adjusting additionally for other demographic variables. However, when adding adjustment to the corresponding sickness absence measure, the total number of days of sickness absence remained significant while the total number of sickness absence spells resulted in a non-significant rise in the risk of

disability retirement. Using odds of disability retirement and chi-squared values, it can be argued that the number of days of sickness absence is as good an indicator of disability retirement as the number of spells of sickness absence.

In summary, this research supports previous literature findings that the number of days of sickness absence predicts disability retirement and that the risk increases with the rise in the duration of the sickness absence spell. This study also found that the average length of sickness absence spells predicts disability retirement which is line with the findings of the other two existing studies (Borg et al., 2001; Wallman et al., 2009).

On the other hand, only two studies evaluated the relationship between the number of sickness absence spells and the risk of disability retirement (Kivimaki et al., 2004; Borg et al., 2001). Borg et al. (2001) did not find an association between the number of sickness absence spells and the risk of disability retirement. However, using a sample from the Finnish 10-town study, Kivimaki et al. (2004) found that individuals with short (1-3 days) or long term (more than 3 days) sickness absence spells had a significant increase in the risk of disability retirement after adjusting for demographic factors.

The current research also found that the number of sickness absence spells predict disability retirement after adjusting for demographic factors. This agrees with the findings of Kivimaki et al. (2004). The current research also showed that when adjusting additionally for the total number of days of sickness absence, the relationship between the number of spells of sickness absence and the risk of disability retirement became non-significantly raised. This is partially in line with Kivimaki et al. (2004) who found that the after adjusting additionally for other sickness absence measures, the number of long term sickness absence spells (more than 3 days) remained a significant predictor of disability retirement while the short term sickness absence spells (1-3 days) became non-significant.

In Chapter Six, the association between self-reported sickness absence and the risk of early retirement intention was evaluated. Only one sickness absence measure was used, the number of days of sickness absence; the results have shown that officers reporting ≥4d of sickness absence (versus 0d) within the last 12 months had a significant increase in the risk of early retirement intention but not officers with 1-3d. There is only one previous study by Heponiemi et al. (2008) which examined the association between sickness absence and the risk of early retirement intentions. Heponiemi et al. (2008) used a binary sickness absence measure (Yes/No) and also found that those reporting sickness absence had a significant increase in the risk of reporting early retirement intentions. Therefore, it can be argued that the current study partially agrees with Heponiemi et al. (2008) because officers with 1-3d of sickness absence did not a significant increase in the risk of holding early retirement intention.

Long term sickness absence is typically associated with long standing or chronic illnesses which may reduce employees working ability. Officers with long term sickness absence may have an increased risk of early retirement intention because they believe that their working ability has declined and that work might cause further health problems (De Wind et al., 2013).

Previous studies have shown that job satisfaction is considered as a strong predictor of early retirement intentions (Topa et al., 2009; Han et al., 2015). The lack of association between short term sickness absence (1-3 days) and early retirement intentions could be explained by the high satisfaction of officers with other job aspects. For example, Heponiemi et al. (2008) showed that organizational injustice strengthens the relationship between sickness absence and the risk of early retirement intentions. Thus, officers reporting 1-3 days of sickness absence may perceive high organizational justice which weakens the association between sickness absence and early retirement intentions.

In the current research, when using the restricted sample of the fully adjusted model, the relationship between sickness absence and the risk of early retirement intention became non-significant when adjusted for age and gender. As sickness absence predicted early retirement intention only in the unadjusted model, the findings of this research only partially agree with hypothesis six (H_6).

As individuals age, their health declines and they tend to take sick leave more frequently in general. In addition, with older age, work ability reduces and employees might take sickness absence more often to recover from the negative consequences of work exposures. Increase in age is hence a potential confounder for the relationship between sickness absence and early retirement intention. Furthermore, it can be argued that with older age, employees are likely to have strong early retirement intentions as they get fed up with their working career and their priorities change. In general, this research adds that sickness absence of ≥4d predicts early retirement intention while sickness absence of 1-3d does not.

7.2 Aim two: evaluating the influence of work factors on the risk of sickness absence or early retirement intentions.

The first systematic review in Chapter Two concluded that there were limited number of studies investigating sickness absence in the police. A small number of studies were conducted in general on the association between work factors and sickness absence or early retirement intention in the police. This has also been documented by previous scholars (Summerfield et al., 2011; Körlin et al., 2009; Svedberg and Alexanderson, 2012).

This research evaluated predictors of sickness absence and early retirement intention, particularly work factors including psychosocial, physical and employees' perception of health and safety management system, in the Abu Dhabi Police. Previous studies have indicated that the validity of the self-reported sickness absence measure compared with

electronically registered sickness absence data is generally good (Ferrie et al., 2005; Voss et al., 2008).

This research found that among work factors, only the combined physical work measure (incorporating nine factors) predicted sickness absence in the police force. In this research, it was hypothesised that psychosocial, physical and employees' perception of health and safety management system predict sickness absence. The findings of this research therefore, generally do not support hypothesis four (H_4). Non-work factors such as gender, partner working status, private life support and other social, health and lifestyle factors were associated with sickness absence in this sample. Smulders and Nijhuis (1999) also reported greater influence of non-work factors on sickness absence than work factors.

As for early retirement intention, job control and demand were not associated with early retirement intention. Low social support at work (from colleagues, supervisors or overall workplace support), holding unfavourable overall perceptions of health and safety management systems and reporting high combined physical exposure at work increased the risk of early retirement intention. When using the sample of the fully adjusted model, the latter factor became non-significant in the unadjusted model while social support and employees' perception of health and safety management system became non-significant after adding social, health and lifestyle factors. Thus, these findings agree partially with hypothesis five (H_5).

The policing job is in general male-dominated, hierarchal and with a semi-military rigid structure. For example, Abu Dhabi Police use similar ranking for police officers and rigid chain of command and reporting systems as that adopted in the military. Therefore, officers may already anticipate certain unfavourable job characteristics such as low job control, high job demand and job strain in their job (Dollard et al., 2003). Given that officers also have

been reported to have high levels of readiness to deal with stress at work, control their emotions and 'solve problems' rather than report 'having problems' (Berg et al., 2006), high job demand and low control at work may not necessarily increase the risk of sickness absence and early retirement intention in the police.

This inherent policing culture that discourages reporting psychological work related problems to colleagues or supervisors may result in shifting the potential consequences of these problems outside of work. For example, high rates of domestic violence were seen in police officers (Waters and Usssery, 2007). Previous studies have also indicated that employees often tend to share work concerns with friends and family more than utilizing other forms of support provided at work (Biddle et al., 2004; Berg et al., 2006). It may can be that this help seeking outside of the work environment is exacerbated in police officers.

In addition, in the Abu Dhabi Police, all sickness absence regardless of spell duration has to be reported and registered in both the electronic human resource file of the employee and the medical file of employee in the medical service department. This rigid system is an essential method for monitoring the occupational health for officers. Nevertheless, when officers encounter work or non-work problems that may necessitate taking sick leave, they may feel reluctant to admit problems at work and avoid taking sickness absence as this may indicate weakness. More frequent sickness absence could subject them to re-allocation to less stressful jobs which may in turn, have negative outcomes (reduced salary and less attractive jobs) (Garbarino et al., 2013).

Thus, when faced with work problems, officers tend to seek support from outside of work and possibly avoid taking sick leave as a mechanism to cope with stress. This could explain the lack of association between workplace support and sickness absence in the police. Social support at work has a buffering influence on stress 'the stress-buffering hypothesis'

protecting workers from the pathological consequences of stressful experiences (House et al., 1988; Parkes et al., 1994; Roberts et al., 1994). This research, however, showed that satisfaction with social life support and frequency of meeting with friends predict sickness absence and not workplace support.

On the other hand, as officers deal with work problems using sources of support outside work, officers with low workplace support may need higher levels of support from private life to 'buffer' the negative effects of work problems. It may be that family and friends (as non-work private sources of support) tend to advise employee to retire early from work as a consequence of the more frequent complaints they receive from the employee regarding work. This could explain the high increase in risk of early retirement intention in officers with low support at work and provide a partial explanation for the absence of the association when social, health and lifestyle factors are included in the analyses. Low support at work is also generally not favourable and experiencing it for prolonged period may directly increase the risk of holding early retirement intention.

However, reasons for the lack of association between employees' overall perception of health and safety management system and the risk of sickness absence and the protective effect of adverse physical working conditions on the risk of sickness absence are not clear. Previous studies have shown that holding favourable occupational health and safety perceptions promotes safe working (McCaughey et al., 2011), minimises occupational injuries (leading indirectly to sickness absence) (Fang et al., 2006) and increases employees' satisfaction with work (Donmez, 2014). Therefore, it may can be that officers could be highly satisfied about other aspects of policing work that minimise the potential impact of holding negative perceptions of the health and safety management system on the risk of sickness absence.

In a Norwegian study, Høivik et al. (2007) also found that employees' perceptions of health and safety management systems did not predict sickness absence or occupational injuries. The sample of the latter study was 10,908 employees working in the Petroleum industry and were primarily exposed to chemical hazards. The study was similar to the current study in that 90% of the sample were males. Høivik et al. (2007) also found a significant negative correlation between confidence in management and style of leadership and sickness absence. Thus, the absence of association between employees' perceptions of the health and safety management systems and the risk of sickness absence in the current study couldmay? be attributed to employees' higher confidence in the police management. Further studies are needed to examine the potential moderation effect of having confidence in leadership on the relationship between holding unfavourable perception of health and safety management system and the risk of sickness absence.

The use of self-reported measures of working conditions, in particular when evaluating physical work factors, is problematic (Allebeck and Mastekaasa, 2004) and is prone to exaggeration by employees (Bockerman and Ilmakunnas, 2008). This could be resolved by using an objective measure (Milton et al., 2000; Melamed et al., 1995) which will provide more insights into the true relationship between physical work factors and sickness absence in the police.

There are many factors that may explain the high risk of early retirement intentions in officers with high exposure to unfavourable physical work factors (combined measure) and those with unfavourable overall perception of the health and safety management system implemented. Adverse working condition may increase officers' intentions for early retirement indirectly through reducing employees' satisfaction with work (Markey et al., 2012; Bockerman & Ilmakunnas, 2008; Han et al., 2015). Employees reporting exposure to unfavourable working conditions may also feel threatened at work which has also been linked

with increasing turnover in general (Bockerman and Ilmakunnas, 2009; Boxall et al., 2003; Cottini et al., 2009). High exposure to unfavourable physical work factors may lead to job stress (de Croon et al., 2003) which is associated with a range of negative health outcomes (Johnson et al., 1996; Virtanen et al., 2007).

The study of Palumbo et al. (2010) investigated the association between nurses' perceptions of employer's health and safety practices and the intention to leave the job within the next 12 months. Similar to the findings of the current study, Palumbo et al. (2010) also showed a significant increase in the risk of intending to leave the job in nurses reporting unfavourable perception of employer's initiatives regarding health and safety.

However, it must be noted that the outcome of Palumbo et al.'s (2010) study reflects turnover intention which is different from the outcome of this study 'early retirement intentions'. Turnover intention reflects employees' willingness to leave the job with the possibility of findings a new job and can happen at any age while early retirement intention reflects employees' willingness to leave the job to reduce psychological work commitment and actual early retirement can only be granted after passing middle age (Hom and Kinicki, 2001; Adam and Beehr, 1998). Thus, employees' perceptions of health and safety management system generally predicts their intention to leave the job either to look for another job (turnover intention) or to take early retirement (early retirement intention).

Finally, employees holding unfavourable perception about organisational support provided, in particular the health and safety management systems, may perceive that their employer is not worried about their general well-being. This in turn, may reduce their feelings of trust of the organisation and discourage long-term commitment to work for the organisation (Hofstetter and Cohen, 2014; Rhoades and Eisenberger, 2002).

7.3 What this research adds to existing literature

In summary, this research is one of the first studies to evaluate determinants of sickness absence, disability retirement and early retirement intentions as indicators of occupational health and safety in a large Middle Eastern organization in general and in a police force operating in the Gulf Corporation Council in specific. This study is also one of few to evaluate the relationship between the number of spells of sickness absence and the average length of sickness absence and the risk of disability retirement. The study showed that number of spells of sickness absence is as good predictor of disability retirement as the number of days of sickness absence.

The findings of the systematic review showed that there are two studies that evaluated the relationship between the number of spells of sickness absence and the average length of sickness absence and the risk of disability retirement. In one hand, this study re-confirmed the findings of Kivimaki et al. (2004) that the number of spells of sickness absence is a predictor of disability retirement while on the other hand, the current research did not agree with the findings of Borg et al. (2001). The findings of this research current research also agree with the other two studies that showed that the average length of sickness absence spells (Borg et al., 2001; Wallman et al., 2009) is a predictor of disability retirement

As for work predictors of sickness absence, the findings of this research do not support the idea that unfavourable psychosocial work factors increase the risk of sickness absence in the police. There was only one study conducted by Magnavita and Garbarino (2013) evaluating the influence of psychosocial work factors on sickness absence in the police force. The latter study also showed no association between psychosocial work factors and sickness absence.

The current study is the first to evaluate the influence of employees' perception of health and safety management system and physical working conditions on the risk of sickness absence

in the police. The research found that unfavourable perceptions of health and safety management systems did not predict sickness absence which is similar to the findings of another study carried out by Høivik et al. (2007) using a sample from the Norwegian Petroleum industry. This research, however, adds new knowledge to existing literature that adverse physical work factors have protective effects from sickness absence in the police.

Literature on predictors of early retirement intentions are generally limited in quantity. This study is one of few to examine work predictors of early retirement intentions in the police. The findings of the current research regarding predictors of early retirement intentions indicate no association between job control and demand and the risk of early retirement intentions. This contradicts with the findings of previous studies (Siegrist et al., 2007; Sejbaek et al., 2013; Elovainio et al., 2005). However, this research agreed with the findings of other studies which showed an increase in the risk of early retirement intentions in employees reporting low workplace support (Han et al., 2015; Elovainio et al., 2003 & 2005).

This research adds new knowledge regarding the increase in risk of early retirement intentions in employees who report unfavourable perceptions of the health and safety management system and those reporting adverse physical working conditions. This research is one of the first to evaluate the latter relationships because previous studies mainly focused on examining the influence of physical workloads on the risk of early retirement intentions (Sejbaek et al., 2012; Blekesaune and Solem, 2005) or evaluated the relationship with respect to other work exit intentions such as turnover (Palumbo et al., 2010).

7.4 Recommendations for future research

In the future, gaining further insights into work predictors of sickness absence and early retirement intention in the police force necessitates focusing on six themes. First, obtaining data regarding other crucial organisational aspects will help deepen the understanding of the association between work predictors and the risk of sickness absence and early retirement intention. These include satisfaction with various job factors (Borgogni et al., 2013; Han et al., 2015); participation and involvement in decision making (Simons and Jankowksi, 2008); information sharing (Cottini et al., 2009) and the extent to which the organisation values employees' contribution (Perryer et al., 2010).

Secondly, evaluating other factors that are specific to the policing job such as sleep disorders (Taimela et al., 2007), divisional level exposures (Habersaat et al., 2015) and stress coping styles (Pienaar et al., 2007) is also essential. For example, Habersaat et al. (2015) showed a significant difference in the reporting of negative health outcome in officers working in different police divisions which was associated with differences in occupational exposures.

Thirdly, validity of future research findings can be improved by asking external examiners to assess work predictors, in particular physical work factors (Milton et al., 2000; Melamed et al., 1995). This will minimise issues associated with subjective measure (Allebeck and Mastekaasa, 2004) such as employees' tendency to exaggerate levels of work exposures (Bockerman and Ilmakunnas, 2008). This will introduce another subjective bias (extent of the accuracy of the external assessor(s)); thus, the validity is improved by the selection of experienced examiners and ensuring that any support, training and resources needed are provided in order for the examiner to conduct assessment appropriately.

When analysing results of future research, stratifying results by gender, age or job type will provide more in depth explanations for differences in results. One of the features of policing

jobs is the gender segregation of tasks as male officers are more likely to work in hazardous jobs while female officers predominantly work with women or children and sexually abused victims (Brown and Fielding, 1993; Brown et al., 1999). In addition, help-seeking behaviour differs between males and females. For example, Berg et al. (2006) found that female police officers seek help from health professionals more often than male officers. In the current research, gender stratified analyses could have provided reasons for lack of association between psychosocial work factors and sickness absence (Vaananen et al., 2003; North et al., 1996).

Fourthly, 22% of police employees who agreed to participate in this research (146/760) also provided their ID and agreed to participate in any future studies as well as consenting for their data to be linked with other data in the future. Thus, the data obtained from this survey can be linked (using the employees' ID) with future data collected using surveys or from a register, converting the cross-sectional data into a longitudinal study, to give insights into various outcomes. For example, baseline work factors could be linked with employees' performance, productivity, visits to health care professionals, opinions regarding organisational specific outcomes, future sickness absence, disability retirement, turnover and early retirement intention.

The systematic review presented in Chapter Two concluded that most studies have used the number of days of sickness absence as a predictor of disability retirement. In this research, this measure, as well as the number of sickness absence spells, were significant predictors of disability retirement. The number of sickness absence spells had the strongest influence on disability retirement.

In the current study, the association between sickness absence and early retirement intention was evaluated using only the number of days of sickness absence. Thus, future research can

investigate the use of sickness absence measures other than the number of days of sickness absence as well as adjustment for potential mediating or moderating factors such as job satisfaction and perceived organisational support. This will help in developing tools to predict early retirement intentions and allow the organisation to evaluate reasons for early retirement intentions and potentially establish plans to minimise turnover.

Finally, this thesis examined the association between sickness absence and disability retirement using a case-control design with two years of follow up sickness absence data. Future studies in the police must aim to adopt a cohort design with as many years of follow up as possible or repeated data collection. One way to resolve the issue of sensitivity of data in the Abu Dhabi Police while adopting a cohort design will be to ask them for denominator data for a short period that does not necessarily reflect the current demographics of the force (for example 2008 and 2009).

7.5 Recommendations for future practice

This thesis provides many suggestions for the Abu Dhabi Police and for law enforcement organisations in general. Police organisations must demonstrate continuing commitment to the improvement of working conditions of police employees by allowing researchers to evaluate the influence of work factors on various health and non-health outcome. This will ensure that work exposures specific to the policing environment are identified thoroughly, which, in turn, will allow for the effective planning and implementation of appropriate health and safety control measures.

Furthermore, police employees may feel reluctant to give honest responses in surveys to avoid being identified and potentially discriminated against or even re-allocated. Therefore, future surveys could be distributed by the police union rather than the management, to minimise bias in responses. This research has also shown that other factors - such as job

satisfaction, job involvement and social factors (such as private life support and frequency of meeting friends) may explain differences in results between the findings of this research and the literature in relation to work predictors of sickness absence and early retirement intentions. Therefore, police organisations are advised to continuously improve employees' satisfaction and social networking (inside and outside the organisation) to minimise the influence of work factors on this intrinsically hazardous occupation.

This research also showed that the number of sickness absence spells and number of days of sickness absence are equally good predictors of disability retirement. Therefore, either of these measures could be used as early indicators when setting plans to minimise disability retirement cases. It is also advisable that the Abu Dhabi Police Medical Committee broadens its duties to include a formal return to work assessment after certain sickness absence periods. For example, employees with a sickness absence of ≥4weeks could be interviewed prior to returning to work to check if they are fit physically and psychologically and to discuss openly the need for further sick leave or other actions or interventions to reduce the likelihood of future sickness absences.

Moreover, police organisations must ensure that appropriate channels are designed and implemented for police employees to seek help when faced with work problems. These channels should maintain anonymity, should not result in re-allocation to undesired posts nor have negative financial consequences and should conform to employees' expectations and needs. For example, the Abu Dhabi Police could establish independently run employee assistance programmes that ensure anonymity and provide care and well-being advice and interventions delivered by staff from various backgrounds such as occupational health psychologists, human resource experts and other career experts.

Finally, in the Abu Dhabi Police, despite explaining the importance of a cohort design in evaluating the association between sickness absence and disability retirement, the management were not in favour of this approach to avoid giving an indication of the general demographic characteristics of the organisation. Thus, the management of the Abu Dhabi Police is advised to establish a research committee that evaluates any request to conduct research using employees' data from researchers working in the police or other organisations and also provide research opportunities and data for academics and policy-makers. The Abu Dhabi Police should also use research findings during the development of occupational policies and ensure appropriate implementation of policies into practice.

References

Abdalla, I. A. 1991. Social support and gender responses to job stress in an Arab culture. Journal of Social Behavior and Personality, 6 (7)273-288.

Abu Dhabi Governemnt E-GATE 2013. Law No. (2) of 2000 on Civil Pensions and Benefits in the Emirate of Abu Dhabi. [online] available from https://www.abudhabi.ae/egovPoolPortal_WAR/appmanager/ADeGP/Citizen?_nfpb=true&_pageLabel=p20166&lang=en&did=279526 [Accessed on 20/11/2013].

Adams, G. A. & Beehr, T. A. 1998. Turnover and retirement: A comparison of their similarities and differences. Personnel psychology, 51 (3)643-665.

Adams, K. F., Schatzkin, A., Harris, T. B., Kipnis, V., Mouw, T., Ballard-Barbash, R., Hollenbeck, A. & Leitzmann, M. F. 2006. Overweight, obesity, and mortality in a large prospective cohort of persons 50 to 71 years old. New England Journal of Medicine, 355 (8)763-778.

Ahola, K., Gould, R., Virtanen, M., Honkonen, T., Aromaa, A. & Lönnqvist, J. 2009. Occupational burnout as a predictor of disability pension: a population-based cohort study. Occupational and environmental medicine, 66 (5)284-290.

Ahola, K., Kivimäki, M., Honkonen, T., Virtanen, M., Koskinen, S., Vahtera, J. & Lönnqvist, J. 2008. Occupational burnout and medically certified sickness absence: a population-based study of Finnish employees. Journal of psychosomatic research, 64 (2)185-193.

Ahola, K., Virtanen, M., Honkonen, T., Isometsä, E., Aromaa, A. & Lönnqvist, J. 2011. Common mental disorders and subsequent work disability: a population-based Health 2000 Study. Journal of affective disorders, 134 (1)365-372.

Åkerlind, I., Alexanderson, K., Hensing, G., Leijon, M. & Bjurulf, P. 1996. Sex differences in sickness absence in relation to parental status. Scandinavian journal of public health, 24 (1)27-35.

Akerstedt, T., Kecklund, G., Alfredsson, L. & Selen, J. 2007. Predicting long‐term sickness absence from sleep and fatigue. Journal of sleep research, 16 (4)341-345.

Ala-Mursula, L., Vahtera, J., Kivimäki, M., Kevin, M. V. & Pentti, J. 2002. Employee control over working times: associations with subjective health and sickness absences. Journal of Epidemiology and Community Health, 56 (4)272-278.

Ala-Mursula, L., Vahtera, J., Linna, A., Pentti, J. & Kivimäki, M. 2005. Employee worktime control moderates the effects of job strain and effort-reward imbalance on sickness absence: the 10-town study. Journal of Epidemiology and Community Health, 59 (10)851-857.

Alati, R., Lawlor, D. A., Najman, J. M., Williams, G. M., Bor, W. & O'Callaghan, M. 2005. Is there really a ‘J‐shaped’ curve in the association between alcohol consumption and symptoms of depression and anxiety? Findings from the Mater‐University Study of Pregnancy and its outcomes*. Addiction, 100 (5)643-651.

Alavinia, S. M., Van Den Berg, T. I., Van Duivenbooden, C., Elders, L. A. & Burdorf, A. 2009. Impact of work-related factors, lifestyle, and work ability on sickness absence among Dutch construction workers. Scandinavian journal of work, environment & health, 325-333.

Albertsen, K., Lund, T., Christensen, K. B., Kristensen, T. S. & Villadsen, E. 2007. Predictors of disability pension over a 10-year period for men and women. Scandinavian journal of public health, 35 (1)78-85.

Alexanderson, K. 1998. Sickness absence: a review of performed studies with focused on levels of exposures and theories utilized. Scandinavian journal of public health, 26 (4)241-249.

Alexanderson, K., Kivimäki, M., Ferrie, J., Westerlund, H., Vahtera, J., Singh-Manoux, A., Melchior, M., Zins, M., Goldberg, M. & Head, J. 2012. Diagnosis-specific sick leave as a long-term predictor of disability pension: a 13-year follow-up of the GAZEL cohort study. Journal of epidemiology and community health, 66 (2)155-159.

Alexanderson, K., Leijon, M., Åkerlind, I., Rydh, H. & Bjurulf, P. 1994. Epidemiology of Sickness Absence in a Swedish County in 1985, 1986 and 1987 A Three Year Longitudinal Study with Focus on Gender, Age and Occupation. Scandinavian journal of public health, 22 (1)27-34.

Alexanderson, K. & Norlund, A. 2004. Sickness absence: causes, consequences, and physicians' sickness certification practice: a systematic literature review by the Swedish Council on Technology Assessment in Health Care. Taylor & Francis.

Alexanderson, K. & Östlin, P. 2000. Work and Ill-health among women and men in Sweden. Worklife and health in Sweden, 119-134.

Alexandersson, K. 1995. Sickness absence in a Swedish county: with reference to gender, occupation, pregnancy and parenthood.

Allaire, S., Wolfe, F., Niu, J., Lavalley, M. & Michaud, K. 2005. Work disability and its economic effect on 55‐64 ‐ year ‐ old adults with rheumatoid arthritis. Arthritis Care & Research, 53 (4)603-608.

Allebeck, P. & Mastekaasa, A. 2004. . Causes of sickness absence: research approaches and explanatory models. Scandinavian journal of public health, 32 (63 suppl)36-43.

Allebeck, P. & Mastekaasa, A. 2004A. . Risk factors for sick leave-general studies. Scandinavian journal of public health, 32 (63 suppl)49-108.

Almeida, D. M., Neupert, S. D., Banks, S. R. & Serido, J. 2005. Do daily stress processes account for socioeconomic health disparities? The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 60 (Special Issue 2)S34-S39.

Altman, D. G. 1990. Practical statistics for medical research. CRC press.

Alves, M. G. d. M., Chor, D., Faerstein, E., Lopes, C. d. S. & Werneck, G. L. 2004. Short version of the" job stress scale": a Portuguese-language adaptation. Revista de Saúde Pública, 38 (2)164-171.

Amstad, F. T., Meier, L. L., Fasel, U., Elfering, A. & Semmer, N. K. 2011. A meta-analysis of work–family conflict and various outcomes with a special emphasis on cross-domain versus matching-domain relations. Journal of occupational health psychology, 16 (2)151.

Andersen, T. M. 2011. Social policies and activation in the Scandinavian welfare model: the case of Denmark.

André-Petersson, L., Engström, G., Hedblad, B., Janzon, L. & Rosvall, M. 2007. Social support at work and the risk of myocardial infarction and stroke in women and men. Social science & medicine, 64 (4)830-841.

Andrea, H., Beurskens, A., Metsemakers, J., Van Amelsvoort, L., Van den Brandt, P. & Van Schayck, C. 2003. Health problems and psychosocial work environment as predictors of long term sickness absence in employees who visited the occupational physician and/or general practitioner in relation to work: a prospective study. Occupational and environmental medicine, 60 (4)295-300.

Angersbach, D., Knauth, P., Loskant, H., Karvonen, M., Undeutsch, K. & Rutenfranz, J. 1980. A retrospective cohort study comparing complaints and diseases in day and shift workers. International archives of occupational and environmental health, 45 (2)127-140.

Arial, M., Gonik, V., Wild, P. & Danuser, B. 2010. Association of work related chronic stressors and psychiatric symptoms in a Swiss sample of police officers; a cross

sectional questionnaire study. International archives of occupational and environmental health, 83 (3)323-331.
Ariëns, G. A., Bongers, P. M., Hoogendoorn, W. E., Houtman, I. L., van der Wal, G. & van Mechelen, W. 2001. High quantitative job demands and low coworker support as risk factors for neck pain: results of a prospective cohort study. Spine, 26 (17)1896-1901.
Arnott, J. & Emmerson, K. 2001. In Sickness and in Health: Reducing sickness absence in the police service. Home Office, Policing and Reducing Crime Unit, Research, Development and Statistics Directorate.
Arokoski, J., Juntunen, M. & Luikku, J. 2002. Use of health-care services, work absenteeism, leisure-time physical activity, musculoskeletal symptoms and physical performance after vocationally oriented medical rehabilitation-description of the courses and a one-and-a-half-year follow-up study with farmers, loggers, police officers and hairdressers. International journal of rehabilitation research, 25 (2)119-131.
Arola, H., Pitkänen, M., Nygård, C. H., Huhtala, H. & Manka, M. L. 2003. The connection between age, job control and sickness absences among Finnish food workers. Occupational Medicine, 53 (3)229-230.
Aronsson, G., Astvik, W. & Thulin, A.-B. 1998. Home-care workers: work conditions and occupational exclusion: a comparison between carers on early-retirement and regular pensions. Home Health Care Services Quarterly, 17 (2)71-91.
Ask, H., Rognmo, K., Torvik, F. A., Røysamb, E. & Tambs, K. 2012. Non-random mating and convergence over time for alcohol consumption, smoking, and exercise: the Nord-Trøndelag Health Study. Behavior genetics, 42 (3)354-365.
Askildsen, J. E., Bratberg, E. & Nilsen, Ø. A. 2005. Unemployment, labor force composition and sickness absence: a panel data study. Health economics, 14 (11)1087-1101.
Astrand, N. & Isacsson, S. 1988. Back pain, back abnormalities, and competing medical, psychological, and social factors as predictors of sick leave, early retirement, unemployment, labour turnover and mortality: a 22 year follow up of male employees in a Swedish pulp and paper company. British journal of industrial medicine, 45 (6)387-395.
Bandura, A. 1997. Self-efficacy: The exercise of control. Macmillan.
Banks, J. & Smith, S. 2006. Retirement in the UK. Oxford Review of Economic Policy, 22 (1)40-56.
Bansback, N., Zhang, W., Walsh, D., Kiely, P., Williams, R., Guh, D., Anis, A. & Young, A. 2012. Factors associated with absenteeism, presenteeism and activity impairment in patients in the first years of RA. Rheumatology, 51 (2)375-384.
Baraku, A., Verdonk, P. & Boumans, N. (2010) The Kosova Police from 2005-07: sickness absenteeism or presenteeism?. European Journal of Publich Health. 230-231.
Bassey, E. J. 1998. Longitudinal changes in selected physical capabilities: muscle strength, flexibility and body size. Age and ageing, 27 (suppl 3)12-16.
Batenburg, M. & Reinken, J. 1990. The relationship between sickness absence from work and pattern of cigarette smoking. The New Zealand Medical Journal, 103 (882)11-13.
Beaton, D. E., Bombardier, C., Guillemin, F. & Ferraz, M. B. 2000. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine, 25 (24)3186-3191.
Beehr, T. A. 1986. The process of retirement: A review and recommendations for future investigation. Personnel Psychology, 39 (1)31-55.
Beehr, T. A., Glazer, S., Nielson, N. L. & Farmer, S. J. 2000. Work and nonwork predictors of employees' retirement ages. Journal of Vocational Behavior, 57 (2)206-225.
Berg, A. M., Hem, E., Lau, B. & Ekeberg, O. 2006. Help-seeking in the Norwegian police service. Journal of occupational health, 48 (3)145-153.

Berg, A. M., Hem, E., Lau, B., Håseth, K. & Ekeberg, Ø. 2005. Stress in the Norwegian police service. Occupational medicine, 55 (2)113-120.
Bernaards, C. M., Ariëns, G. A. & Hildebrandt, V. H. 2006. The (cost-) effectiveness of a lifestyle physical activity intervention in addition to a work style intervention on the recovery from neck and upper limb symptoms in computer workers. BMC musculoskeletal disorders, 7 (1)80.
Bernardy, K. & Sandweg, R. 2003. [Early pensioning: reasons and sequelae. A retrospective study of prognosis in early pensioning and course of illness subsequent to premature retirement]. Der Nervenarzt, 74 (5)406-412.
Bernin, P., Theorell, T. & Sandberg, C. 2001. Biological correlates of social support and pressure at work in managers. Integrative Physiological & Behavioral Science, 36 121-136.
Bertera, R. L. 1990. The effects of workplace health promotion on absenteeism and employment costs in a large industrial population. American Journal of Public Health, 80 (9)1101-1105.
Bertera, R. L. 1991. The effects of behavioral risks on absenteeism and health-care costs in the workplace. Journal of occupational and environmental medicine, 33 (11)1119.
Bertera, R. L. 1993. Behavioral risk factor and illness day changes with workplace health promotion: two-year results. American Journal of Health Promotion, 7 (5)365-373.
Biddle, L., Gunnell, D., Sharp, D. & Donovan, J. L. 2004. Factors influencing help seeking in mentally distressed young adults: a cross-sectional survey. British Journal of General Practice, 54 (501)248-253.
Biering-Sørensen, F., Lund, J., Høydalsmo, O., Darre, E. M., Deis, A., Kryger, P. & Müller, C. 1999. Risk indicators of disability pension. A 15 year follow-up study. Danish medical bulletin, 46 (3)258-262.
Bingefors, K. & Isacson, D. 2004. Epidemiology, co‐morbidity, and impact on health‐related quality of life of self‐reported headache and musculoskeletal pain—a gender perspective. European Journal of Pain, 8 (5)435-450.
Black, C. D. & Frost, D. 2011. Health at work-an independent review of sickness absence. TSO Shop.
Blank, N. & Diderichsen, F. 1995. Short-term and long-term sick-leave in Sweden Relationships with social circumstances, working conditions and gender. Scandinavian journal of public health, 23 (4)265-272.
Blekesaune, M. & Solem, P. E. 2005. Working Conditions and Early Retirement A Prospective Study of Retirement Behavior. Research on aging, 27 (1)3-30.
Blondal, S. & Pearson, M. 1995. Unemployment and other non-employment benefits. Oxford Review of Economic Policy, 11 (1)136-69.
Böckerman, P. & Ilmakunnas, P. 2008. Interaction of working conditions, job satisfaction, and sickness absences: evidence from a representative sample of employees. Social Science & Medicine, 67 (4)520-528.
Böckerman, P. & Ilmakunnas, P. 2009. Job disamenities, job satisfaction, quit intentions, and actual separations: Putting the pieces together. Industrial Relations: A Journal of Economy and Society, 48 (1)73-96.
Böckerman, P., Johansson, E., Helakorpi, S. & Uutela, A. 2009. Economic inequality and population health: looking beyond aggregate indicators. Sociology of health & illness, 31 (3)422-440.
Böckerman, P. & Laukkanen, E. 2010. What makes you work while you are sick? Evidence from a survey of workers. The European Journal of Public Health, 20 (1)43-46.
Boedeker, W. 2001. Associations between workload and diseases rarely occurring in sickness absence data. Journal of occupational and environmental medicine, 43 (12)1081-1088.

Bonde, J. P. E. 2008. Psychosocial factors at work and risk of depression: a systematic review of the epidemiological evidence. Occupational and environmental medicine, 65 (7)438-445.
Bongers, P. M., Boshuizen, H. C., Hulshof, C. T. & Koemeester, A. P. 1988. Back disorders in crane operators exposed to whole-body vibration. International Archives of Occupational and Environmental Health, 60 (2)129-137.
Bonifacio, P. 2013. The psychological effects of police work: A psychodynamic approach. Springer Science & Business Media.
Bonsdorff, M. v. 2009. Intentions of early retirement and continuing to work among middle-aged and older employees.
Borg, K., Hensing, G. & Alexanderson, K. 2001. Predictive factors for disability pension—an 11-year follow up of young persons on sick leave due to neck, shoulder, or back diagnoses. Scandinavian journal of public health, 29 (2)104-112.
Borg, K., Hensing, G. & Alexanderson, K. 2004. Risk factors for disability pension over 11 years in a cohort of young persons initially sick-listed with low back, neck, or shoulder diagnoses. Scandinavian journal of public health, 32 (4)272-278.
Borgogni, L., Dello Russo, S., Miraglia, M. & Vecchione, M. 2013. The role of self-efficacy and job satisfaction on absences from work. Revue Européenne de Psychologie Appliquée/European Review of Applied Psychology, 63 (3)129-136.
Borritz, M., Rugulies, R., Christensen, K., Villadsen, E. & Kristensen, T. 2006. Burnout as a predictor of self-reported sickness absence among human service workers: prospective findings from three year follow up of the PUMA study. Occupational and environmental medicine, 63 (2)98-106.
Boumans, N. P., De Jong, A. H. & Vanderlinden, L. 2008. Determinants of early retirement intentions among Belgian nurses. Journal of advanced nursing, 63 (1)64-74.
Bourbonnais, R., Brisson, C., Moisan, J. & Vezina, M. 1996. Job strain and psychological distress in white-collar workers. Scandinavian journal of work, environment & health, 139-145.
Bourbonnais, R. & Mondor, M. 2001. Job strain and sickness absence among nurses in the province of Quebec. American journal of industrial medicine, 39 (2)194-202.
Bourbonnais, R., Vinet, A., Vézina, M. & Gingras, S. 1992. Certified sick leave as a non-specific morbidity indicator: a case-referent study among nurses. British journal of industrial medicine, 49 (10)673-678.
Bowers, T. 2001. Teacher absenteeism and ill health retirement: A review. Cambridge Journal of Education, 31 (2)135-157.
Boxall, P., Macky, K. & Rasmussen, E. 2003. Labour turnover and retention in New Zealand: The causes and consequences of leaving and staying with employers. Asia Pacific Journal of Human Resources, 41 (2)196-214.
Boyce, R. W., Dyer, E. A., Willett, T. K., Figueroa, J. L. & Jones, G. R. 2015. Police weight-loss competition in the United States with gender, age, and job comparisons with health promotion recommendations. International Journal of Health Promotion and Education, (ahead-of-print)1-12.
Boyce, R. W., Jones, G. R. & Hiatt, A. R. 1991. Physical fitness capacity and absenteeism of police officers. Journal of occupational and environmental medicine, 33 (11)1137-1143.
Boyce, R. W., Perko, M. A., Jones, G. R., Hiatt, A. H. & Boone, E. L. 2006. Physical fitness, absenteeism and workers' compensation in smoking and non-smoking police officers. Occupational medicine, 56 (5)353-356.

Brage, S., Haldorsen, E. M. H., Johannesen, T. S., Ursin, H. & Tellnes, G. 1995. The use of case histories to explore concepts of disease, illness and sickness certification. Family practice, 12 (1)75-83.

Brage, S., Sandanger, I. & Nygård, J. F. 2007. Emotional distress as a predictor for low back disability: a prospective 12-year population-based study. Spine, 32 (2)269-274.

Brandt, L. P. & Nielsen, C. V. 1992. Job stress and adverse outcome of pregnancy: a causal link or recall bias? American journal of epidemiology, 135 (3)302-311.

Bransby, E. & Thomson, D. 1953. Sick absence in the Metropolitan police, especially that due to respiratory infections. Monthly bulletin of the Ministry of Health and the Public Health Laboratory Service, 12 32-43.

Bratberg, E., Dahl, S. Å. & Risa, A. E. 2002. 'The Double Burden': Do Combinations of Career and Family Obligations Increase Sickness Absence among Women? European Sociological Review, 18 (2)233-249.

Brenner, H. & Ahern, W. 2000. Sickness absence and early retirement on health grounds in the construction industry in Ireland. Occupational and environmental medicine, 57 (9)615-620.

Brett, T. D., Arnold-Reed, D. E., Hince, D. A., Wood, I. K. & Moorhead, R. G. 2009. Retirement intentions of general practitioners aged 45–65 years. Med J Aust, 191 (2)75-77.

Brisson, C., Blanchette, C., Guimont, C., Dion, G., Moisan, J., Vézina, M., Dagenais, G. R. & M sse, L. 1998. Reliability and validity of the French version of the 18-item Karasek Job Content Questionnaire. Work & Stress, 12 (4)322-336.

Brown, J., Campbell, E. A. & Fife‐Schaw, C. 1995. Adverse impacts experienced by police officers following exposure to sex discrimination and sexual harassment. Stress Medicine, 11 (1)221-228.

Brown, J. & Fielding, J. 1993. Qualitative differences in men and women police officers' experience of occupational stress. Work & Stress, 7 (4)327-340.

Brown, J., Fielding, J. & Grover, J. 1999. Distinguishing traumatic, vicarious and routine operational stressor exposure and attendant adverse consequences in a sample of police officers. Work & Stress, 13 (4)312-325.

Brown, S. & Sessions, J. G. 1996. The economics of absence: theory and evidence. Journal of Economic Surveys, 10 (1)23-53.

Brox, J. & Frøystein, O. 2005. Health-related quality of life and sickness absence in community nursing home employees: randomized controlled trial of physical exercise. Occupational medicine, 55 (7)558-563.

Brun, C., Bøggild, H. & Eshøj, P. 2003. [Socioeconomic risk indicators for disability pension within the Danish workforce. A registry-based cohort study of the period 1994-1998]. Ugeskrift for laeger, 165 (35)3315-3319.

Bruusgaard, D., Smeby, L. & Claussen, B. 2010. Education and disability pension: a stronger association than previously found. Scandinavian journal of public health, 38 (7)686-690.

Bültmann, U., Huibers, M. J., van Amelsvoort, L. P., Kant, I., Kasl, S. V. & Swaen, G. M. 2005. Psychological distress, fatigue and long-term sickness absence: prospective results from the Maastricht Cohort Study. Journal of occupational and environmental medicine, 47 (9)941-947.

Bültmann, U., Kant, I., Kasl, S. V., Beurskens, A. J. & van den Brandt, P. A. 2002. Fatigue and psychological distress in the working population: psychometrics, prevalence, and correlates. Journal of psychosomatic research, 52 (6)445-452.

Bültmann, U., Nielsen, M. B. D., Madsen, I. E., Burr, H. & Rugulies, R. 2013. Sleep disturbances and fatigue: independent predictors of sickness absence? A prospective study among 6538 employees. The European Journal of Public Health, 23 (1)123-128.
Burke, R. J., Richardsen, A. M. & Martinussen, M. 2006. Gender differences in policing: reasons for optimism? Policing: An International Journal of Police Strategies & Management, 29 (3)513-523.
Bush, R. & Wooden, M. 1995. Smoking and absence from work: Australian evidence. Social Science & Medicine, 41 (3)437-446.
Cargiulo, T. 2007. Understanding the health impact of alcohol dependence. American Journal of Health-System Pharmacy, 64.
Carlsen, K., Dalton, S. O., Frederiksen, K., Diderichsen, F. & Johansen, C. 2008. Cancer and the risk for taking early retirement pension: a Danish cohort study. Scandinavian journal of public health, 36 (2)117-125.
Cascio, W. F. & Valenzi, E. R. 1978. Relations among criteria of police performance. Journal of Applied Psychology, 63 (1)22.
Chadwick-Jones, J. K., Brown, C. & Nicholson, N. 1973. Absence from work; its meaning, measurement and control. Applied Psychology, 22 (2)137-154.
Chadwick-Jones, J. K., Brown, C., Nicholson, N. & Sheppard, C. 1971. Absence measures: Their reliability and stability in an industrial setting. Personnel Psychology, 24 (3)463-470.
Chang, P. P., Ford, D. E., Mead, L. A., Cooper-Patrick, L. & Klag, M. J. 1997. Insomnia in young men and subsequent depression The Johns Hopkins Precursors Study. American Journal of Epidemiology, 146 (2)105-114.
Chaupain-Guillot, S. & Guillot, O. 2009. Les absences au travail en Europe. Travail et emploi, (4)17-31.
Cheng, Y., Kawachi, I., Coakley, E. H., Schwartz, J. & Colditz, G. 2000. Association between psychosocial work characteristics and health functioning in American women: prospective study. Bmj, 320 (7247)1432-1436.
Cheng, Y., Luh, W.-M. & Guo, Y.-L. 2003. Reliability and validity of the Chinese version of the Job Content Questionnaire in Taiwanese workers. International journal of behavioral medicine, 10 (1)15-30.
Chevalier, A., Luce, D., Blanc, C. & Goldberg, M. 1987. Sickness absence at the French National Electric and Gas Company. British journal of industrial medicine, 44 (2)101-110.
Choobineh, A., Ghaem, H. & Ahmedinejad, P. 2011. Validity and reliability of the Persian [Farsi] version of the Job Content Questionnaire: a study among hospital nurses.
Christensen, K. B., Feveile, H., Labriola, M. & Lund, T. 2008. The impact of psychosocial work environment factors on the risk of disability pension in Denmark. The European Journal of Public Health, 18 (3)235-237.
Christensen, K. B., Lund, T., Labriola, M., Bültmann, U. & Villadsen, E. 2007. The impact of health behaviour on long term sickness absence: results from DWECS/DREAM. Ind Health, 45 (2)348-51.
Clausen, T. & Borg, V. 2010. Do positive work-related states mediate the association between psychosocial work characteristics and turnover? A longitudinal analysis. International Journal of Stress Management, 17 (4)308.
Clausen, T., Kristiansen, J., Hansen, J. V., Pejtersen, J. H. & Burr, H. 2013. Exposure to disturbing noise and risk of long-term sickness absence among office workers: a prospective analysis of register-based outcomes. International archives of occupational and environmental health, 86 (7)729-734.

Claussen, B. & Dalgard, O. S. 2009. Disability pensioning: The gender divide can be explained by occupation, income, mental distress and health. Scandinavian journal of public health, 37 (6)590-597.
Clegg, C. W. 1983. Psychology of employee lateness, absence, and turnover: A methodological critique and an empirical study. Journal of Applied Psychology, 68 (1)88.
Co-operation, O. f. E. & Development 2003. Transforming disability into ability: Policies to promote work and income security for disabled people. Organisation for Economic Co-operation and Development.
Cohen, S. & Wills, T. A. 1985. Stress, social support, and the buffering hypothesis. Psychological bulletin, 98 (2)310.
Collins, J. J., Baase, C. M., Sharda, C. E., Ozminkowski, R. J., Nicholson, S., Billotti, G. M., Turpin, R. S., Olson, M. & Berger, M. L. 2005. The assessment of chronic health conditions on work performance, absence, and total economic impact for employers. Journal of occupational and environmental medicine, 47 (6)547-557.
Collins, P. & Gibbs, A. 2003. Stress in police officers: a study of the origins, prevalence and severity of stress ‐ related symptoms within a county police force. Occupational Medicine, 53 (4)256-264.
Colquitt, J. A. 2001. On the dimensionality of organizational justice: a construct validation of a measure. Journal of Applied Psychology, 86 (3)386.
Comrey, A. L. & Lee, H. B. 2013. A first course in factor analysis. Psychology Press.
Connelly, L. 2008. Pilot studies. Medsurg nursing: official journal of the Academy of Medical-Surgical Nurses, 17 (6)411.
Cottini, E., Kato, T. & Westergaard-Nielsen, N. 2011. Adverse workplace conditions, high-involvement work practices and labor turnover: Evidence from Danish linked employer–employee data. Labour Economics, 18 (6)872-880.
Cox, T. & Griffiths, A. 1995. The nature and measurement of work stress: theory and practice. The evaluation of human work: A practical ergonomics methodology. London: Taylor & Francis.
Cox, T., Karanika-Murray, M., Griffiths, A., Vida Wong, Y. & Hardy, C. 2009. Developing the management standards approach within the context of common health problems in the workplace: A Delphi study.
Crawford, R. & Disney, R. 2013. Reform of ill-health retirement of police in England and Wales: impact on pension liabilities and the role of local finance. IFS Working Papers.
Cronbach, L. J. 1951. Coefficient alpha and the internal structure of tests. psychometrika, 16 (3)297-334.
Cunradi, C. B., Greiner, B. A., Ragland, D. R. & Fisher, J. 2005. Alcohol, stress-related factors, and short-term absenteeism among urban transit operators. Journal of urban health, 82 (1)43-57.
Dahl, S.-A., Nilsen IV, O. A. & Vaage, K. 2000. Work or retirement? Exit routes for Norwegian elderly. Applied Economics, 32 (14)1865-1876.
Dahl, S. Å., Nilsen, Ø. A. & Vaage, K. 2003. Gender differences in early retirement behaviour. European Sociological Review, 19 (2)179-198.
Dalen, H. v. & Henkens, K. 2003. Early retirement reform: Can it work? Will it work?
de Araújo, T. M. & Karasek, R. 2008. Validity and reliability of the job content questionnaire in formal and informal jobs in Brazil. SJWEH Supplements, (6)52-59.
De Boer, A., Van Beek, J., Durinck, J., Verbeek, J. & Van Dijk, F. 2004. An occupational health intervention programme for workers at risk for early retirement; a randomised controlled trial. Occupational and Environmental medicine, 61 (11)924-929.

de Croon, E. M., Sluiter, J. K. & Frings-Dresen, M. H. 2003. Need for recovery after work predicts sickness absence: a 2-year prospective cohort study in truck drivers. Journal of psychosomatic research, 55 (4)331-339.

de Jonge, J., Bosma, H., Peter, R. & Siegrist, J. 2000B. Job strain, effort-reward imbalance and employee well-being: a large-scale cross-sectional study. Social Science & Medicine, 50 (9)1317-1327.

De Jonge, J., Reuvers, M. M., Houtman, I. L., Bongers, P. M. & Kompier, M. A. 2000A. Linear and nonlinear relations between psychosocial job characteristics, subjective outcomes, and sickness absence: Baseline results from SMASH. Journal of occupational health psychology, 5 (2)256.

De Loes, M. & Jansson, B. 2002. Work-related acute injuries from mandatory fitness training in the Swedish Police Force. International journal of sports medicine, 23 (03)212-217.

De Vivo, M. J., Stuart Krause, J. & Lammertse, D. P. 1999. Recent trends in mortality and causes of death among persons with spinal cord injury. Archives of physical medicine and rehabilitation, 80 (11)1411-1419.

De Wind, A., Geuskens, G. A., Reeuwijk, K. G., Westerman, M. J., Ybema, J. F., Burdorf, A., Bongers, P. & Van der Beek, A. J. 2013. Pathways through which health influence early retirement: a qualitative study. BMC Publ Health, 13 292.

Dean, A., Kolody, B. & Wood, P. 1990. Effects of social support from various sources on depression in elderly persons. Journal of Health and Social Behavior.

Dekkers-Sanchez, P. M., Hoving, J. L., Sluiter, J. K. & Frings-Dresen, M. H. 2008. Factors associated with long-term sick leave in sick-listed employees: a systematic review. Occupational and environmental medicine, 65 (3)153-157.

Dellve, L., Eriksson, J. & Vilhelmsson, R. 2007. Assessment of long-term work attendance within human service organisations. Work: A Journal of Prevention, Assessment and Rehabilitation, 29 (2)71-80.

Dellve, L., Karlberg, C., Allebeck, P., Herloff, B. & Hagberg, M. 2006. Macro-organizational factors, the incidence of work disability, and work ability among the total workforce of home care workers in Sweden. Scandinavian journal of public health, 34 (1)17-25.

Demerouti, E., Bakker, A. B., Nachreiner, F. & Schaufeli, W. B. 2000. A model of burnout and life satisfaction amongst nurses. Journal of advanced nursing, 32 (2)454-464.

Demerouti, E., Geurts, S. A., Bakker, A. B. & Euwema, M. 2004. The impact of shiftwork on work–home conflict, job attitudes and health. Ergonomics, 47 (9)987-1002.

Demerouti, E., Le Blanc, P. M., Bakker, A. B., Schaufeli, W. B. & Hox, J. 2009. Present but sick: a three-wave study on job demands, presenteeism and burnout. Career Development International, 14 (1)50-68.

Department for Communities and Local Government 2014. Local Government Pension Scheme Funds England 2013-14. [online] available from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/368099/Pension_Release_England_2013-14.pdf [Accessed on 20/05/2015].

Dewa, C. S. & Lin, E. 2000. Chronic physical illness, psychiatric disorder and disability in the workplace. Social science & medicine, 51 (1)41-50.

Dionne, G. & Dostie, B. 2007. New evidence on the determinants of absenteeism using linked employer-employee data. Industrial and Labor Relations Review, 108-120.

Dirkzwager, A. J., Yzermans, C. J. & Kessels, F. 2004. Psychological, musculoskeletal, and respiratory problems and sickness absence before and after involvement in a disaster: a longitudinal study among rescue workers. Occupational and environmental medicine, 61 (10)870-872.

Dixon, J. P., Dixon, J. K. & Spinner, J. C. 1991. Tensions between career and interpersonal commitments as a risk factor for cardiovascular disease among women. Women & health, 17 (3)33-57.
Dollard, M., Winefield, H. R. & Winefield, A. H. 2003. Occupational stress in the service professions. CRC Press.
Donmez, M. 2014. The effects of safety perception of the police in the city of Diyarbakir on job satisfaction. European Scientific Journal, 10 (5).
Dorning, H., Haase, I., Hofmann, W. & Schwartz, F. 1997. The risk of early retirement because of inability to practice one's profession or inability to earn, longitudinal analysis of health insurance panel data (Germ). Occupational Health and Industrial Medicine, 36 (3).
Doshi, J. A., Cen, L. & Polsky, D. 2008. Depression and Retirement in Late Middle‐Aged US Workers. Health Services Research, 43 (2)693-713.
Duijts, S. F., Kant, I., Landeweerd, J. A. & Swaen, G. M. 2006. Prediction of sickness absence: development of a screening instrument. Occupational and environmental medicine, 63 (8)564-569.
Duijts, S. F., Kant, I., Swaen, G. M., van den Brandt, P. A. & Zeegers, M. 2007. A meta-analysis of observational studies identifies predictors of sickness absence. Journal of clinical epidemiology, 60 (11)1105-1115.
Dwyer, D. S. & Mitchell, O. S. 1999. Health problems as determinants of retirement: Are self-rated measures endogenous? Journal of health economics, 18 (2)173-193.
Edimansyah, B., Rusli, B., Naing, L. & Mazalisah, M. 2006. Reliability and construct validity of the Malay version of the Job Content Questionnaire (JCQ). Southeast Asian journal of tropical medicine and public health, 37 (2)412.
Edwards, P. K. & Scullion, H. 1982. The social organization of industrial conflict: Control and resistance in the workplace. Blackwell Oxford.
Einarsen, S. 2000. Harassment and bullying at work: A review of the Scandinavian approach. Aggression and violent behavior, 5 (4)379-401.
Eisenberger, R. 1989. Blue Monday: The loss of the work ethic in America. IICA.
Ejlertsson, L. E., Goran 1999. Quality of life among early retirees. Experimental aging research, 25 (4)471-475.
Elovainio, M., Forma, P., Kivimäki, M., Sinervo, T., Sutinen, R. & Laine, M. 2005a. Job demands and job control as correlates of early retirement thoughts in Finnish social and health care employees. Work & Stress, 19 (1)84-92.
Elovainio, M., Kivimäki, M. & Vahtera, J. 2002. Organizational justice: evidence of a new psychosocial predictor of health. American Journal of Public Health, 92 (1)105-108.
Elovainio, M., Kivimäki, M., Vahtera, J., Ojanlatva, A., Korkeila, K., Suominen, S., Helenius, H. & Koskenvuo, M. 2003. Social support, early retirement, and a retirement preference: a study of 10,489 Finnish adults. Journal of Occupational and Environmental Medicine, 45 (4)433-439.
Elovainio, M., van den Bos, K., Linna, A., Kivimäki, M., Ala-Mursula, L., Pentti, J. & Vahtera, J. 2005b. Combined effects of uncertainty and organizational justice on employee health: testing the uncertainty management model of fairness judgments among Finnish public sector employees. Social Science & Medicine, 61 (12)2501-2512.
Emerson, L. D. 1950. Sick Leave Policies in Police Departments: Mounting Absences Emphasize the Need for Better Controls. J. Crim. L. & Criminology, 41 675.
Emmons, K. M. 2000. Health behaviors in a social context. Social epidemiology, 242-266.

English, P. B., Shaw, G. M., Windham, G. C. & Neutra, R. R. 1989. Illness and absenteeism among California highway patrol officers responding to hazardous material spills. Archives of Environmental Health: An International Journal, 44 (2)117-119.

Enthoven, P., Skargren, E., Carstensen, J. & Oberg, B. 2006. Predictive factors for 1-year and 5-year outcome for disability in a working population of patients with low back pain treated in primary care. Pain, 122 (1)137-144.

Eriksen, H., Ihlebaek, C., Mikkelsen, A., Grønningsæter, H., Sandal, G. & Ursin, H. 2002. Improving subjective health at the worksite: a randomized controlled trial of stress management training, physical exercise and an integrated health programme. Occupational medicine, 52 (7)383-391.

Eriksen, W. & Bruusgaard, D. 2002. Physical leisure-time activities and long-term sick leave: a 15-month prospective study of nurses' aides. Journal of occupational and environmental medicine, 44 (6)530-538.

Eriksen, W., Bruusgaard, D. & Knardahl, S. 2003. Work factors as predictors of sickness absence: a three month prospective study of nurses' aides. Occupational and environmental medicine, 60 (4)271-278.

Eriksen, W., Natvig, B. & Bruusgaard, D. 1999. Marital disruption and long-term work disability A four-year prospective study. Scandinavian journal of public health, 27 (3)196-202.

Eriksen, W., Natvig, B. & Bruusgaard, D. 2001. Sleep problems: a predictor of long-term work disability? A four-year prospective study. Scandinavian journal of public health, 29 (1)23-31.

Eshoj, P., Jepsen, J. & Nielsen, C. V. 2001. Long‐term sickness absence—risk indicators among occupationally active residents of a Danish county. Occupational Medicine, 51 (5)347-353.

Esping-Andersen, G. 2011. Pensions at a Glance 2011: Retirement-Income Systems in OECD and G20 Countries. OECD, Paris.

Essebag, V., Platt, R. W., Abrahamowicz, M. & Pilote, L. 2005. Comparison of nested case-control and survival analysis methodologies for analysis of time-dependent exposure. BMC medical research methodology, 5 (1)5.

Eum, K.-D., Li, J., Jhun, H.-J., Park, J.-T., Tak, S.-W., Karasek, R. & Cho, S.-I. 2007. Psychometric properties of the Korean version of the job content questionnaire: data from health care workers. International archives of occupational and environmental health, 80 (6)497-504.

Evans, O. & Steptoe, A. 2001. Social support at work, heart rate, and cortisol: a self-monitoring study. Journal of Occupational Health Psychology, 6 (4)361.

Evans, O. & Steptoe, A. 2002. The contribution of gender-role orientation, work factors and home stressors to psychological well-being and sickness absence in male-and female-dominated occupational groups. Social Science & Medicine, 54 (4)481-492.

Evans, R., Pistrang, N. & Billings, J. 2013. Police officers' experiences of supportive and unsupportive social interactions following traumatic incidents. European journal of psychotraumatology, 4.

Eyal, A., Carel, R. S. & Goldsmith, J. R. 1994. Factors affecting long-term sick leave in an industrial population. International archives of occupational and environmental health, 66 (4)279-282.

Eyler, A. A., Vest, J. R., Sanderson, B., Wilbur, J., Matson-Koffman, D., Evenson, K. R., Thompson, J. L., Wilcox, S. & Young, D. R. 2002. Environmental, policy, and cultural factors related to physical activity in a diverse sample of women: the Women's Cardiovascular Health Network Project–introduction and methodology. Women & health, 36 (2)1-15.

Falba, T. A. & Sindelar, J. L. 2008. Spousal concordance in health behavior change. Health Services Research, 43 (1p1)96-116.
Fang, D., Chen, Y. & Wong, L. 2006. Safety climate in construction industry: A case study in Hong Kong. Journal of construction engineering and management.
Farrell, D. & Stamm, C. L. 1988. Meta-analysis of the correlates of employee absence. Human Relations, 41 (3)211-227.
Fekedulegn, D., Burchfiel, C., Hartley, T., Baughman, P., Charles, L., Andrew, M. & Violanti, J. 2013B. Work hours and absenteeism among police officers. International journal of emergency mental health, 15 (4)267-276.
Fekedulegn, D., Burchfiel, C. M., Hartley, T. A., Andrew, M. E., Charles, L. E., Tinney-Zara, C. A. & Violanti, J. M. 2013A. Shiftwork and sickness absence among police officers: the BCOPS study. Chronobiology international, 30 (7)930-941.
Feldman, D. C. 1994. The decision to retire early: A review and conceptualization. Academy of management review, 19 (2)285-311.
Fernández-Castro, J., Limonero, J. T., González-Olmedo, M. P., Serrano, R., López, V. & Rovira, T. 2015. Early Retirement Intention in Workers from the Industry and Service Sectors: Influence of the Perception of Benefits from Retiring or from Continuing to Work. Open Journal of Social Sciences, 3 (04)79.
Ferraz, M. 1997. Cross cultural adaptation of questionnaires: what is it and when should it be performed? The Journal of rheumatology, 24 (11)2066.
Ferrie, J. E., Head, J., Shipley, M. J., Vahtera, J., Marmot, M. G. & Kivimäki, M. 2007. BMI, obesity, and sickness absence in the Whitehall II study. Obesity, 15 (6)1554-1564.
Ferrie, J. E., Kivimäki, M., Head, J., Shipley, M., Vahtera, J. & Marmot, M. 2005. A comparison of self-reported sickness absence with absences recorded in employers' registers: evidence from the Whitehall II study. Occupational and Environmental Medicine, 62 (2)74-79.
Flegal, K. M., Graubard, B. I., Williamson, D. F. & Gail, M. H. 2007. Cause-specific excess deaths associated with underweight, overweight, and obesity. Jama, 298 (17)2028-2037.
Ford, D. E. & Cooper‐Patrick, L. 2001. Sleep disturbances and mood disorders: an epidemiologic perspective. Depression and Anxiety, 14 (1)3-6.
Forma, P., Tuominen, E. & Väänänen-Tomppo, I. 2006. Finnish pension reform and intentions of older workers to continue at work. Finnish Centre for Pensions.
Fransen, M., Wilsmore, B., Winstanley, J., Woodward, M., Grunstein, R., Ameratunga, S. & Norton, R. 2006. Shift work and work injury in the New Zealand Blood Donors' Health Study. Occupational and environmental medicine, 63 (5)352-358.
Franssen, P. M., Bültmann, U., Kant, I. & van Amelsvoort, L. G. 2003. The association between chronic diseases and fatigue in the working population. Journal of psychosomatic research, 54 (4)339-344.
Fried, Y., Melamed, S. & Ben‐David, H. A. 2002. The joint effects of noise, job complexity, and gender on employee sickness absence: An exploratory study across 21 organizations−the CORDIS study. Journal of Occupational and Organizational Psychology, 75 (2)131-144.
Friis, K., Ekholm, O. & Hundrup, Y. A. 2008. The relationship between lifestyle, working environment, socio‐demographic factors and expulsion from the labour market due to disability pension among nurses. Scandinavian journal of caring sciences, 22 (2)241-248.
Friis, K., Ekholm, O., Hundrup, Y. A., Obel, E. B. & Grønbæk, M. 2007. Influence of health, lifestyle, working conditions, and sociodemography on early retirement among

nurses: The Danish Nurse Cohort Study. Scandinavian journal of public health, 35 (1)23-30.
Frone, M. R. 1999. Work stress and alcohol use. Alcohol Research and Health, 23 (4)284-291.
Fronstin, P. 1999. Retirement patterns and employee benefits: do benefits matter? The Gerontologist, 39 (1)37-48.
Frost, P., Haahr, J. P. & Andersen, J. H. 2007. Reduction of pain-related disability in working populations: a randomized intervention study of the effects of an educational booklet addressing psychosocial risk factors and screening workplaces for physical health hazards. Spine, 32 (18)1949-1954.
Fuhrer, R., Shipley, M., Chastang, J., Schmaus, A., Niedhammer, I., Stansfeld, S., Goldberg, M. & Marmot, M. 2002. Socioeconomic position, health, and possible explanations: a tale of two cohorts. American Journal of Public Health, 92 (8)1290-1294.
Fuortes, L. J., Shi, Y., Zhang, M., Zwerling, C. & Schootman, M. 1994. Epidemiology of back injury in university hospital nurses from review of workers' compensation records and a case-control survey. Journal of occupational and environmental medicine, 36 (9)1022-1026.
Gabbay, M., Taylor, L., Sheppard, L., Hillage, J., Bambra, C., Ford, F., Preece, R., Taske, N. & Kelly, M. P. 2011. NICE guidance on long-term sickness and incapacity. The British Journal of General Practice, 61 (584)e118.
Ganster, D. C., Pagon, M. & Duffy, M. 1996. Organizational and interpersonal sources of stress in the Slovenian police force.
Ganster, D. C. & Schaubroeck, J. 1991. Work stress and employee health. Journal of Management, 17 (2)235-271.
Garbarino, S., Chiorri, C., Magnavita, N., Piattino, S. & Cuomo, G. 2012. Personality profiles of special force police officers. Journal of Police and Criminal Psychology, 27 (2)99-110.
Garbarino, S., Cuomo, G., Chiorri, C. & Magnavita, N. 2013. Association of work-related stress with mental health problems in a special police force unit. BMJ open, 3 (7)e002791.
Gardner, J., Scogin, F., Vipperman, R. & Varela, J. G. 1998. The predictive validity of peer assessment in law enforcement: a 6 year follow‐up. Behavioral Sciences & the Law, 16 (4)473-478.
Garson, D. 2008. Factor Analysis: Statnotes. Retrieved March 22, 2008, from North Carolina State University Public Administration Program.
Gehring, J., Koenig, W., Rana, N. & Mathes, P. 1988. The influence of the type of occupation on return to work after myocardial infarction, coronary angioplasty and coronary bypass surgery. European heart journal, 9 (suppl L)109-114.
Gerdtham, U.-G. & Ruhm, C. J. 2006. Deaths rise in good economic times: evidence from the OECD. Economics & Human Biology, 4 (3)298-316.
Gimeno, D., Amick, B., Habeck, R., Ossmann, J. & Katz, J. 2005. The role of job strain on return to work after carpal tunnel surgery. Occupational and environmental medicine, 62 (11)778-785.
Gimeno, D., Benavides, F. G., Amick, B. C., Benach, J. & Martínez, J. M. 2004. Psychosocial factors and work related sickness absence among permanent and non-permanent employees. Journal of epidemiology and community health, 58 (10)870-876.
Gjerland, A., Pedersen, M. J., Ekeberg, O. & Skogstad, L. 2015a. Sick-leave and help seeking among rescue workers after the terror attacks in Norway, 2011. International Journal of Emergency Medicine, 8 (1)81.

Gjerland, A., Pedersen, M. J. B., Ekeberg, Ø. & Skogstad, L. 2015b. Sick-leave and help seeking among rescue workers after the terror attacks in Norway, 2011. International journal of emergency medicine, 8 (1)1-8.

Gjesdal, S. & Bratberg, E. 2002. The role of gender in long‐term sickness absence and transition to permanent disability benefits Results from a multiregister based, prospective study in Norway 1990‐1995. The European Journal of Public Health, 12 (3)180-186.

Gjesdal, S. & Bratberg, E. 2003. Diagnosis and duration of sickness absence as predictors for disability pension: results from a three-year, multi-register based* and prospective study. Scandinavian journal of public health, 31 (4)246-254.

Gjesdal, S., Bratberg, E. & Mæland, J. G. 2009a. Musculoskeletal impairments in the Norwegian working population: the prognostic role of diagnoses and socioeconomic status: a prospective study of sickness absence and transition to disability pension. Spine, 34 (14)1519-1525.

Gjesdal, S., Bratberg, E. & Mæland, J. G. 2011. Gender differences in disability after sickness absence with musculoskeletal disorders: five-year prospective study of 37,942 women and 26,307 men. BMC musculoskeletal disorders, 12 (1)37.

Gjesdal, S., Haug, K., Ringdal, P., Mæland, J. G., Hagberg, J., Røraas, T., Vollset, S. E. & Alexanderson, K. 2009b. Sickness absence with musculoskeletal or mental diagnoses, transition into disability pension and all-cause mortality: a 9-year prospective cohort study. Scandinavian journal of public health, 37 (4)387-394.

Gjesdal, S., Ringdal, P. R., Haug, K. & Gunnar Mæland, J. 2008. Long-term sickness absence and disability pension with psychiatric diagnoses: a population-based cohort study. Nordic journal of psychiatry, 62 (4)294-301.

Gjesdal, S., Ringdal, P. R., Haug, K. & Mæland, J. G. 2004. Predictors of disability pension in long-term sickness absence Results from a population-based and prospective study in Norway 1994–1999. The European Journal of Public Health, 14 (4)398-405.

Godin, I. & Kittel, F. 2004. Differential economic stability and psychosocial stress at work: associations with psychosomatic complaints and absenteeism. Social Science & Medicine, 58 (8)1543-1553.

Goine, H., Knutsson, A., Marklund, S. & Karlsson, B. 2004. Sickness absence and early retirement at two workplaces—effects of organisational intervention in Sweden. Social science & medicine, 58 (1)99-108.

Goodman, A. M. 1990. A model for police officer burnout. Journal of Business and Psychology, 5 (1)85-99.

Greenberg, J. & Colquitt, J. A. 2013. Handbook of organizational justice. Psychology Press.

Greenhalgh, T. & Peacock, R. 2005. Effectiveness and efficiency of search methods in systematic reviews of complex evidence: audit of primary sources. BMJ: British Medical Journal, 331 (7524)1064.

Griffiths, A. 2000. Designing and managing healthy work for older workers. Occupational Medicine, 50 (7)473-477.

Guest, R. 1982. A comparison of the rates of sickness absence between the male population of Royal Air Force Waddington and the Lincolnshire Police Force during November 1980. Occupational medicine, 32 (1)185-189.

Guillemin, F., Bombardier, C. & Beaton, D. 1993. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. Journal of clinical epidemiology, 46 (12)1417-1432.

Gustafsson, K. & Marklund, S. 2011. Consequences of sickness presence and sickness absence on health and work ability: a Swedish prospective cohort study. International journal of occupational medicine and environmental health, 24 (2)153-165.

Gustavsson, A., Bjorkman, J., Ljungcrantz, C., Rhodin, A., Rivano‐Fischer, M., Sjolund, K. F. & Mannheimer, C. 2012. Socio‐economic burden of patients with a diagnosis related to chronic pain‐Register data of 840,000 Swedish patients. European journal of pain, 16 (2)289-299.

Gustman, A. L. & Steinmeier, T. L. 1984. Partial retirement and the analysis of retirement behavior. National Bureau of Economic Research Cambridge, Mass., USA.

Guthrie, R. 2010. Sick leave and workers' compensation for police officers in Australia. Journal of law and medicine, 17 (5)816.

Gyi, D. & Porter, J. 1998. Musculoskeletal problems and driving in police officers. Occupational medicine, 48 (3)153-160.

Habersaat, S. A., Geiger, A. M., Abdellaoui, S. & Wolf, J. M. 2015. Health in police officers: Role of risk factor clusters and police divisions. Social Science & Medicine, 143 213-222.

Hackett, D. P. & Violanti, J. M. 2003. Police suicide: Tactics for prevention. Charles C Thomas Publisher.

Hadi, A. A., Naing, N. N., Daud, A. & Nordin, R. 2006. Reliability and construct validity of the Malay version of the Job Content Questionnaire (JCQ) among secondary school teachers in Kota Bharu, Kelantan, Malaysia.

Hagen, K. B., Holte, H. H., Tambs, K. & Bjerkedal, T. 2000. Socioeconomic factors and disability retirement from back pain: a 1983–1993 population-based prospective study in Norway. Spine, 25 (19)2480-2487.

Hagen, K. B., Tambs, K. & Bjerkedal, T. 2002. A prospective cohort study of risk factors for disability retirement because of back pain in the general working population. Spine, 27 (16)1790-1796.

Haines III, V. Y., Marchand, A., Rousseau, V. & Demers, A. 2008. The mediating role of work-to-family conflict in the relationship between shiftwork and depression. Work & Stress, 22 (4)341-356.

Hakola, T. 2000. Navigating through the Finnish pension system.

Halford, C., Wallman, T., Welin, L., Rosengren, A., Bardel, A., Johansson, S., Eriksson, H., Palmer, E., Wilhelmsen, L. & Svärdsudd, K. 2012. Effects of self-rated health on sick leave, disability pension, hospital admissions and mortality. A population-based longitudinal study of nearly 15,000 observations among Swedish women and men. BMC public health, 12 (1)1103.

Hallberg, H. & Mattsson, B. 1992. Separation and distress-sickness absence and health screening in newly divorced middle-aged Swedish men. Scandinavian journal of primary health care, 10 (2)91-97.

Han, K., Trinkoff, A. M. & Gurses, A. P. 2015. Work‐related factors, job satisfaction and intent to leave the current job among United States nurses. Journal of clinical nursing.

Hanebuth, D., Meinel, M. & Fischer, J. E. 2006. Health-related quality of life, psychosocial work conditions, and absenteeism in an industrial sample of blue-and white-collar employees: a comparison of potential predictors. Journal of occupational and environmental medicine, 48 (1)28-37.

Hansen, C. D. & Andersen, J. H. 2008. Going ill to work–What personal circumstances, attitudes and work-related factors are associated with sickness presenteeism? Social Science & Medicine, 67 (6)956-964.

Hansen Falkdal, A., Edlund, C. & Dahlgren, L. 2006. Experiences within the process of sick leave. Scandinavian Journal of Occupational Therapy, 13 (3)170-182.

Hansson, T. & Jensen, I. 2004. Sickness absence due to back and neck disorders. Scandinavian journal of public health, 32 (63 suppl)109-151.

Harkonmäki, K., Lahelma, E., Martikainen, P., Rahkonen, O. & Silventoinen, K. 2006A. Mental health functioning (SF-36) and intentions to retire early among ageing municipal employees: the Helsinki Health Study. Scandinavian journal of public health, 34 (2)190-198.

Harkonmäki, K., Martikainen, P., Lahelma, E., Pitkäniemi, J., Halmeenmäki, T., Silventoinen, K. & Rahkonen, O. 2009. Intentions to retire, life dissatisfaction and the subsequent risk of disability retirement. Scandinavian journal of public health, 37 (3)252-259.

Harkonmäki, K., Rahkonen, O., Martikainen, P., Silventoinen, K. & Lahelma, E. 2006B. Associations of SF-36 mental health functioning and work and family related factors with intentions to retire early among employees. Occupational and environmental medicine, 63 (8)558-563.

Harrington, J. 1994. Shift work and health--a critical review of the literature on working hours. Annals of the Academy of Medicine, Singapore, 23 (5)699-705.

Harrison, D. A., Newman, D. A., Schmitt, N. & Highhouse, S. 2012. Absence, lateness, turnover, and retirement: narrow and broad understandings of withdrawal and behavioral engagement. Handbook of Psychology, Vol. 12, Industrial and Organizational Psychology, 262-91.

Hartig, T. & Fransson, U. 2006. Housing tenure and early retirement for health reasons in Sweden. Scandinavian journal of public health, 34 (5)472-479.

Haskell, W. L., Lee, I.-M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., Macera, C. A., Heath, G. W., Thompson, P. D. & Bauman, A. 2007. Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. Circulation, 116 (9)1081.

Hasle, H. & Jeune, B. 1989. The significance of working conditions with regard to disability pensions. A case-controlled study among unskilled workers]. Ugeskrift for laeger, 151 (30)1929.

Hatfield, E., Walster, G. W. & Berscheid, E. 1978. Equity: Theory and research. Allyn and Bacon Boston.

Haugen, K., Holm, E., Lundevaller, E. & Westin, K. 2008. Localised attitudes matter: a study of sickness absence in Sweden. Population, Space and Place, 14 (3)189-207.

Haukenes, I., Gjesdal, S., Rortveit, G., Riise, T. & Mæland, J. 2012. Women's higher likelihood of disability pension: the role of health, family and work. A 5–7 years follow-up of the Hordaland Health Study. BMC public health, 12 (1)720.

Haukenes, I., Mykletun, A., Knudsen, A. K., Hansen, H.-T. & Mæland, J. G. 2011. Disability pension by occupational class-the impact of work-related factors: The Hordaland Health Study Cohort. BMC public health, 11 (1)406.

Head, J., Ferrie, J. E., Alexanderson, K., Westerlund, H., Vahtera, J. & Kivimäki, M. 2008. Diagnosis-specific sickness absence as a predictor of mortality: the Whitehall II prospective cohort study. BMJ: British Medical Journal, 337.

Head, J., Kivimäki, M., Siegrist, J., Ferrie, J. E., Vahtera, J., Shipley, M. J. & Marmot, M. G. 2007. Effort–reward imbalance and relational injustice at work predict sickness absence: the Whitehall II study. Journal of psychosomatic research, 63 (4)433-440.

Heaney, C. A. & Clemans, J. 1995. Occupational stress, physician-excused absences, and absences not excused by a physician. American Journal of Health Promotion, 10 (2)117-124.

Hemingway, H., Shipley, M. J., Stansfeld, S. & Marmot, M. 1997. Sickness absence from back pain, psychosocial work characteristics and employment grade among office workers. Scandinavian journal of work, environment & health, 23 (2)121-129.

Hemp, P. 2004. Presenteeism: at work-but out of it. harvard business review, 82 (10)49-58.

Henderson, M., Glozier, N. & Elliott, K. H. 2005. Long term sickness absence: is caused by common conditions and needs managing. BMJ: British Medical Journal, 330 (7495)802.
Hendrix, W. H., Spencer, B. A. & Gibson, G. S. 1994. Organizational and extraorganizational factors affecting stress, employee well-being, and absenteeism for males and females. Journal of Business and Psychology, 9 (2)103-128.
Henkens, K. 1999. Retirement intentions and spousal support: A multi-actor approach. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 54 (2)S63-S73.
Henkens, K. & Tazelaar, F. 1994. Early Retirement of Civil Servants in the Netherlands1. Journal of Applied Social Psychology, 24 (21)1927-1943.
Henkens, K. & Tazelaar, F. 1997. Explaining retirement decisions of civil servants in the netherlands intentions, behavior; and the discrepancy between the two. Research on aging, 19 (2)139-173.
Henkens, K. & Van Solinge, H. 2002. Spousal influences on the decision to retire. International Journal of Sociology, 55-74.
Hennekens, C. H., Buring, J. E. & Mayrent, S. L. 1987. Epidemiology in medicine. Boston: Little Brown and Company, 1987.
Hennessy, S., Bilker, W. B., Berlin, J. A. & Strom, B. L. 1999. Factors influencing the optimal control-to-case ratio in matched case-control studies. American journal of epidemiology, 149 (2)195-197.
Hensing, G. & Alexanderson, K. 2000. The relation of adult experience of domestic harassment, violence, and sexual abuse to health and sickness absence. International Journal of Behavioral Medicine, 7 (1)1-18.
Hensing, G. & Alexanderson, K. 2004. The association between sex segregation, working conditions, and sickness absence among employed women. Occupational and environmental medicine, 61 (2)e7-e7.
Heponiemi, T., Kouvonen, A., Vänskä, J., Halila, H., Sinervo, T., Kivimäki, M. & Elovainio, M. 2008. Health, psychosocial factors and retirement intentions among Finnish physicians. Occupational medicine, 58 (6)406-412.
Herquelot, E., Guéguen, A., Bonenfant, S. & Dray-Spira, R. 2011. Impact of Diabetes on Work Cessation Data from the GAZEL cohort study. Diabetes Care, 34 (6)1344-1349.
Hersch, J. & Viscusi, W. K. 1998. Smoking and other risky behaviors. Journal of Drug Issues.
Higashi, T., Sakurai, H., Satoh, T. & Toyama, T. 1988. Absenteeism of shift and day workers with special reference to peptic ulcer. Asia-Pacific Journal of Public Health, 2 (2)112-119.
Hinkka, K., Kuoppala, J., Väänänen-Tomppo, I. & Lamminpää, A. 2013. Psychosocial work factors and sick leave, occupational accident, and disability pension: a cohort study of civil servants. Journal of Occupational and Environmental Medicine, 55 (2)191-197.
HM Treasury 2000. Review of ill health retirement in the public sector. [online] Available from: http://archive.treasury.gov.uk/pdf/2000/ill_health110700.pdf. [Accessed on 10/02/2014].
Hoang, T. G., Corbière, M., Negrini, A., Pham, M. K. & Reinharz, D. 2013. Validation of the Karasek to measure job strain in Vietnam Psychological reports, 113 (2)363-379.
Hochschild, A. R. & McDermott, M. 1998. The time bind: when work becomes home and home becomes work. Political Science Quarterly, 113 (1)16-20.
Hofstetter, H. & Cohen, A. 2014. The mediating role of job content plateau on the relationship between work experience characteristics and early retirement and turnover intentions. Personnel Review, 43 (3)350-376.

Høivik, D., Baste, V., Brandsdal, E. & Moen, B. E. 2007. Associations between self-reported working conditions and registered health and safety results. Journal of Occupational and environmental Medicine, 49 (2)139-147.
Holden, L., Scuffham, P. A., Hilton, M. F., Vecchio, N. N. & Whiteford, H. A. 2010. Work performance decrements are associated with Australian working conditions, particularly the demand to work longer hours. Journal of occupational and environmental medicine, 52 (3)281-290.
Holte, H. H., Tambs, K. & Bjerkedal, T. 2000. Manual work as predictor for disability pensioning with osteoarthritis among the employed in Norway 1971–1990. International journal of epidemiology, 29 (3)487-494.
Hom, P. W. & Kinicki, A. J. 2001. Toward a greater understanding of how dissatisfaction drives employee turnover. Academy of Management Journal, 44 (5)975-987.
House, J. S., Landis, K. R. & Umberson, D. 1988A. Social relationships and health. Science, 241 (4865)540-545.
House, J. S., Umberson, D. & Landis, K. R. 1988B. Structures and processes of social support. Annual review of sociology, 14 (1)293-318.
Houser, N., Jackson, B., Bartie, J., Peterson, P., 2004. Emergency responder injuries and fatalities: An analysis of surveillance Data. Rand Corporation.
Houston, D. K., Cai, J. & Stevens, J. 2008. Overweight and obesity in young and middle age and early retirement: the ARIC study. Obesity, 17 (1)143-149.
Houtman, I. L., Bongers, P. M., Smulders, P. G. & Kompier, M. A. 1994. Psychosocial stressors at work and musculoskeletal problems. Scandinavian Journal of Work Environment and Health, 20 (2)139-145.
Huang, Y., Macera, C. A., Blair, S. N., Brill, P. A., Kohl 3rd, H. & Kronenfeld, J. J. 1998. Physical fitness, physical activity, and functional limitation in adults aged 40 and older. Medicine and science in sports and exercise, 30 (9)1430-1435.
Hughes, K. & DeMaio, T. Does this question work? Evaluating cognitive interview results using respondent debriefing questions. Annual Meeting of the American Association for Public Opinion Research, St. Petersburg, Florida, 2001.
Huhtaniemi, P. 1995. The sense of life control and thoughts of early retirement. Turun yliopisto.
Hunt, E., Jones, N., Hastings, V. & Greenberg, N. 2013. TRiM: An organizational response to traumatic events in Cumbria Constabulary. Occupational medicine, 63 (8)549-555.
Hurrell Jr, J. J., Nelson, D. L. & Simmons, B. L. 1998. Measuring job stressors and strains: where we have been, where we are, and where we need to go. Journal of occupational health psychology, 3 (4)368.
Hwalek, M., Firestone, I. & Hoffman, W. 1982. The role social pressures play in early retirement propensities. Aging & Work.
IJzelenberg, H., Meerding, W.-J. & Burdorf, A. 2007. Effectiveness of a back pain prevention program: a cluster randomized controlled trial in an occupational setting. Spine, 32 (7)711-719.
IJzelenberg, W., Molenaar, D. & Burdorf, A. 2004. Different risk factors for musculoskeletal complaints and musculoskeletal sickness absence. Scandinavian journal of work, environment & health, 30 (1)56-63.
Ilmarinen, J. & Rantanen, J. 1999. Promotion of work ability during ageing. American Journal of Industrial Medicine, 36 (S1)21-23.
Isacsson, A., Hanson, B. S., Janzon, L. & Kugelberg, G. 1992. The epidemiology of sick leave in an urban population in Malmö, Sweden. Scandinavian journal of public health, 20 (4)234-239.

Ishizaki, M., Kawakami, N., Honda, R., Nakagawa, H., Morikawa, Y. & Yamada, Y. 2006. Psychosocial work characteristics and sickness absence in Japanese employees. International archives of occupational and environmental health, 79 (8)640-646.

Jacobson, B. H. & Aldana, S. G. 2001. Relationship between frequency of aerobic activity and illness-related absenteeism in a large employee sample. Journal of occupational and environmental medicine, 43 (12)1019-1025.

Jacobson, B. H., Aldana, S. G., Goetzel, R. Z., Vardell, K., Adams, T. B. & Pietras, R. J. 1996. The relationship between perceived stress and self-reported illness-related absenteeism. American Journal of Health Promotion, 11 (1)54-61.

Jans, M. P., van den Heuvel, S. G., Hildebrandt, V. H. & Bongers, P. M. 2007. Overweight and obesity as predictors of absenteeism in the working population of the Netherlands. Journal of occupational and environmental medicine, 49 (9)975-980.

Jansen, N., Van Amelsvoort, L., Kristensen, T., Van den Brandt, P. & Kant, I. 2003. Work schedules and fatigue: a prospective cohort study. Occupational and environmental medicine, 60 (suppl 1)i47-i53.

Jansen, N. W., Kant, I., van Amelsvoort, L. G., Kristensen, T. S., Swaen, G. M. & Nijhuis, F. J. 2006. Work–family conflict as a risk factor for sickness absence. Occupational and environmental medicine, 63 (7)488-494.

Janssen, I. & Mark, A. E. 2007. Elevated body mass index and mortality risk in the elderly. Obesity reviews, 8 (1)41-59.

Janssen, N., Kant, I., Swaen, G., Janssen, P. & Schröer, C. 2003. Fatigue as a predictor of sickness absence: results from the Maastricht cohort study on fatigue at work. Occupational and environmental medicine, 60 (suppl 1)i71-i76.

Jeffery, R. W., Forster, J. L., Dunn, B. V., French, S. A., McGovern, P. G. & Lando, H. A. 1993. Effects of work-site health promotion on illness-related absenteeism. Journal of occupational and environmental medicine, 35 (11)1142-1146.

Jenkins, R. 1986. Sex differences in alcohol consumption and its associated morbidity in young civil servants. British journal of addiction, 81 (4)525-535.

Jenkins, R., Lewis, G., Bebbington, P., Brugha, T., Farrell, M., Gill, B. & Meltzer, H. 1997. The National Psychiatric Morbidity Surveys of Great Britain– initial findings from the Household Survey. Psychological medicine, 27 (4)775-789.

Jensen, L. D., Ryom, P. K., Christensen, M. V. & Andersen, J. H. 2012. Differences in risk factors for voluntary early retirement and disability pension: a 15-year follow-up in a cohort of nurses' aides. BMJ open, 2 (6).

Job Content Centre 2012. Recommended format. [Online] Avaliable from: http://jcqcenter.org/Recommended%20Format.html [Accessed on 12/05/2014].

Johns, G. 1997. Contemporary research on absence from work: Correlates, causes and consequences. International review of industrial and organizational psychology, 12 115-174.

Johnson, J. V. & Hall, E. M. 1988. Job strain, work place social support, and cardiovascular disease: a cross-sectional study of a random sample of the Swedish working population. American journal of public health, 78 (10)1336-1342.

Johnson, J. V., Hall, E. M. & Theorell, T. 1989. Combined effects of job strain and social isolation on cardiovascular disease morbidity and mortality in a random sample of the Swedish male working population. Scandinavian journal of work, environment & health, 271-279.

Johnson, J. V., Stewart, W., Hall, E. M., Fredlund, P. & Theorell, T. 1996. Long-term psychosocial work environment and cardiovascular mortality among Swedish men. American Journal of Public Health, 86 (3)324-331.

Judge, T. A. & Bono, J. E. 2001. Relationship of core self-evaluations traits—self-esteem, generalized self-efficacy, locus of control, and emotional stability—with job satisfaction and job performance: A meta-analysis. Journal of Applied Psychology, 86 (1)80.
Judiesch, M. K. & Lyness, K. S. 1999. Left behind? The impact of leaves of absence on managers' career success. Academy of Management Journal, 42 (6)641-651.
Juniper, B., White, N. & Bellamy, P. 2010. A new approach to evaluating the well-being of police. Occupational medicine, 60 (7)560-565.
Karasek Jr, R. A. 1979. Job demands, job decision latitude, and mental strain: Implications for job redesign. Administrative science quarterly, 285-308.
Karasek, R., Brisson, C., Kawakami, N., Houtman, I., Bongers, P. & Amick, B. 1998. The Job Content Questionnaire (JCQ): an instrument for internationally comparative assessments of psychosocial job characteristics. Journal of occupational health psychology, 3 (4)322.
Karasek, R. A. 1979. Job demands, job decision latitude, and mental strain: Implications for job redesign. Administrative science quarterly, 24 (2).
Karasek, R. A. 1990. Healthy work: stress, productivity, and the reconstruction of working life. Basic books.
Karesek, R. & Theorell, T. 1990. Healthy work. Stress, productivity and the reconstruction of work life. New York: Basic Books.
Karlsson, N. E., Carstensen, J. M., Gjesdal, S. & Alexanderson, K. A. 2008. Risk factors for disability pension in a population-based cohort of men and women on long-term sick leave in Sweden. The European journal of public health, 18 (3)224-231.
Karpansalo, M., Kauhanen, J., Lakka, T., Manninen, P., Kaplan, G. & Salonen, J. 2005. Depression and early retirement: prospective population based study in middle aged men. Journal of epidemiology and community health, 59 (1)70-74.
Karpansalo, M., Manninen, P., Kauhanen, J., Lakka, T. A. & Salonen, J. T. 2004. Perceived health as a predictor of early retirement. Scandinavian journal of work, environment & health, 287-292.
Karpansalo, M., Manninen, P., Lakka, T. A., Kauhanen, J., Rauramaa, R. & Salonen, J. T. 2002. Physical workload and risk of early retirement: prospective population-based study among middle-aged men. Journal of Occupational and Environmental Medicine, 44 (10)930-939.
Kawakami, N. & Haratani, T. 1999. Epidemiology of job stress and health in Japan: review of current evidence and future direction. Industrial health, 37 (2)174-186.
Kawakami, N., Kobayashi, F., Araki, S., Haratani, T. & Furui, H. 1995. Assessment of job stress dimensions based on the job demands-control model of employees of telecommunication and electric power companies in Japan: reliability and validity of the Japanese version of the Job Content Questionnaire. International Journal of Behavioral Medicine, 2 (4)358-375.
Kelloway, E. K., Barling, J. & Weber, C. 2002. Smoking and absence from work. Voluntary Employee Withdrawal and Inattendance. Springer.
Kerkhofs, M., Lindeboom, M. & Theeuwes, J. 1999. Retirement, financial incentives and health. Labour Economics, 6 (2)203-227.
Kesaniemi, Y., Danforth Jr, E., Jensen, M. D., Kopelman, P. G., Lefèbvre, P. & Reeder, B. A. 2001. Dose-response issues concerning physical activity and health: an evidence-based symposium. Medicine and science in sports and exercise, 33 (6 Suppl)S351.
Kessler, R. C., Brown, R. L. & Broman, C. L. 1981. Sex differences in psychiatric help-seeking: evidence from four large-scale surveys. Journal of Health and Social Behavior.

Kiessling, A. & Henriksson, P. Cognitive function predicts sick leave and early retirement in an unselected population of patients with coronary artery disease. European Heart Journal 2002. WB SAUNDERS 732-732.
Kirkcaldy, B. B., Cooper, C. L., Brown, J. M. & Athanasou, J. A. 1994. Job stress and health profiles of smokers, ex‐smokers and non‐smokers. Stress medicine, 10 (3)159-166.
Kirkwood, B. & Sterne, J. 2003. Controlling for confounding: stratification. Essential Medical Statistics. Blackwell Publishing.
Kivimäki, M., Elovainio, M. & Vahtera, J. 2000A. Workplace bullying and sickness absence in hospital staff. Occupational and environmental medicine, 57 (10)656-660.
Kivimäki, M., Ferrie, J. E., Hagberg, J., Head, J., Westerlund, H., Vahtera, J. & Alexanderson, K. 2007. Diagnosis-specific sick leave as a risk marker for disability pension in a Swedish population. Journal of Epidemiology and Community Health, 61 (10)915-920.
Kivimäki, M., Forma, P., Wikström, J., Halmeenmäki, T., Pentti, J., Elovainio, M. & Vahtera, J. 2004. Sickness absence as a risk marker of future disability pension: the 10-town study. Journal of epidemiology and community health, 58 (8)710-711.
Kivimäki, M., Vahtera, J., Koskenvuo, M., Uutela, A. & Pentti, J. 1998. Response of hostile individuals to stressful changes in their working lives: test of a psychosocial vulnerability model. Psychol Med, 28 (4)903-913.
Kivimäki, M., Vahtera, J., Pentti, J. & Ferrie, J. E. 2000B. Factors underlying the effect of organisational downsizing on health of employees: longitudinal cohort study. Bmj, 320 (7240)971-975.
Kivimäki, M., Vahtera, J., Thompson, L., Griffiths, A., Cox, T. & Pentti, J. 1997. Psychosocial factors predicting employee sickness absence during economic decline. Journal of Applied Psychology, 82 (6)858.
Kivimäki, M., Virtanen, M., Elovainio, M., Kouvonen, A., Väänänen, A. & Vahtera, J. 2006. Work stress in the etiology of coronary heart disease—a meta-analysis. Scandinavian journal of work, environment & health, 431-442.
Kleiven, M., Bøggild, H. & Jeppesen, H. J. 1997. Shift work and sick leave. Scandinavian journal of work, environment & health, 24 128-133.
Knutsson, A. & Bøggild, H. 2010. Gastrointestinal disorders among shift workers. Scandinavian journal of work, environment & health, 36 (2).
Knutsson, A. & Goine, H. 1998. Occupation and unemployment rates as predictors of long term sickness absence in two Swedish counties. Social Science & Medicine, 47 (1)25-31.
Koller, M. 1983. Health risks related to shift work. International archives of occupational and environmental health, 53 (1)59-75.
Kompier, M. 2003. Job design and well-being. The handbook of work and health psychology, 429-454.
Kondo, K., Kobayashi, Y., Hirokawa, K., Tsutsumi, A., Kobayashi, F., Haratani, T., Araki, S. & Kawakami, N. 2006. Job strain and sick leave among Japanese employees: a longitudinal study. International archives of occupational and environmental health, 79 (3)213-219.
Korchounov, A. & Bogomazov, G. 2006. Employment, medical absenteeism, and disability perception in Parkinson's disease: A pilot double‐blind, randomized, placebo‐controlled study of entacapone adjunctive therapy. Movement disorders, 21 (12)2220-2224.
Körlin, J., Alexanderson, K. & Svedberg, P. 2009. Sickness absence among women and men in the police: A systematic literature review. Scandinavian journal of public health, 37 (3)310-319.

Kotler, P. & Wingard, D. L. 1989. The effect of occupational, marital and parental roles on mortality: the Alameda County Study. American Journal of Public Health, 79 (5)607-612.
Kouros, C. D. & Cummings, E. M. 2010. Longitudinal Associations Between Husbands' and Wives' Depressive Symptoms. Journal of Marriage and Family, 72 (1)135-147.
Krantz, G. & Östergren, P.-O. 2000. Common symptoms in middle aged women: their relation to employment status, psychosocial work conditions and social support in a Swedish setting. Journal of Epidemiology and Community Health, 54 (3)192-199.
Krause, N., Lynch, J., Kaplan, G. A., Cohen, R. D., Goldberg, D. E. & Salonen, J. T. 1997. Predictors of disability retirement. Scandinavian journal of work, environment & health, 403-413.
Kristensen, T. R., Jensen, S. M., Kreiner, S. & Mikkelsen, S. 2010. Socioeconomic status and duration and pattern of sickness absence. A 1-year follow-up study of 2331 hospital employees. BMC public health, 10 (1)643.
Kristensen, T. S. 1991. Sickness absence and work strain among Danish slaughterhouse workers: an analysis of absence from work regarded as coping behaviour. Social Science & Medicine, 32 (1)15-27.
Krokstad, S., Johnsen, R. & Westin, S. 2002. Social determinants of disability pension: a 10-year follow-up of 62 000 people in a Norwegian county population. International journal of epidemiology, 31 (6)1183-1191.
Krokstad, S., Magnus, P., Skrondal, A. & Westin, S. 2004. The importance of social characteristics of communities for the medically based disability pension. The European Journal of Public Health, 14 (4)406-412.
Krokstad, S. & Westin, S. 2004. Disability in society—medical and non-medical determinants for disability pension in a Norwegian total county population study. Social science & medicine, 58 (10)1837-1848.
Kubicek, B., Korunka, C., Hoonakker, P. & Raymo, J. M. 2010. Work and family characteristics as predictors of early retirement in married men and women. Research on aging, 32 (4)467-498.
Kuper, H., Adami, H.-O., Theorell, T. & Weiderpass, E. 2007. The socioeconomic gradient in the incidence of stroke a prospective study in middle-aged women in Sweden. Stroke, 38 (1)27-33.
Kyröläinen, H., Häkkinen, K., Kautiainen, H., Santtila, M., Pihlainen, K. & Häkkinen, A. 2008. Physical fitness, BMI and sickness absence in male military personnel. Occupational medicine, 58 (4)251-256.
Laaksonen, M., Kääriä, S.-M., Leino-Arjas, P. & Lahelma, E. 2011. Different domains of health functioning as predictors of sickness absence—a prospective cohort study. Scandinavian journal of work, environment & health, 37 (3)213-218.
Laaksonen, M., Martikainen, P., Rahkonen, O. & Lahelma, E. 2008. Explanations for gender differences in sickness absence: evidence from middle-aged municipal employees from Finland. Occupational and environmental medicine, 65 (5)325-330.
Laaksonen, M., Mastekaasa, A., Martikainen, P., Rahkonen, O., Piha, K. & Lahelma, E. 2010a. Gender differences in sickness absence-the contribution of occupation and workplace. Scandinavian journal of work, environment & health, 394-403.
Laaksonen, M., Piha, K., Martikainen, P., Rahkonen, O. & Lahelma, E. 2009. Health-related behaviours and sickness absence from work. Occupational and environmental medicine, 66 (12)840-847.
Laaksonen, M., Piha, K. & Sarlio‐Lähteenkorva, S. 2007. Relative weight and sickness absence. Obesity, 15 (2)465-472.

Laaksonen, M., Pitkäniemi, J., Rahkonen, O. & Lahelma, E. 2010b. Work arrangements, physical working conditions, and psychosocial working conditions as risk factors for sickness absence: Bayesian analysis of prospective data. Annals of epidemiology, 20 (5)332-338.

Laaksonen, M., Roos, E., Rahkonen, O., Martikainen, P. & Lahelma, E. 2005. Influence of material and behavioural factors on occupational class differences in health. Journal of epidemiology and community health, 59 (2)163-169.

Labriola, M., Feveile, H., Christensen, K. B., Str∅ yer, J. & Lund, T. 2009. The impact of ergonomic work environment exposures on the risk of disability pension: Prospective results from DWECS/DREAM. Ergonomics, 52 (11)1419-1422.

Labriola, M. & Lund, T. 2007. Self-reported sickness absence as a risk marker of future disability pension. Prospective findings from the DWECS/DREAM study 1990-2004. International journal of medical sciences, 4 (3)153.

Labriola, M., Lund, T. & Burr, H. 2006. Prospective study of physical and psychosocial risk factors for sickness absence. Occupational medicine, 56 (7)469-474.

Lahelma, E., Laaksonen, M., Lallukka, T., Martikainen, P., Pietiläinen, O., Saastamoinen, P., Gould, R. & Rahkonen, O. 2012. Working conditions as risk factors for disability retirement: a longitudinal register linkage study. BMC public health, 12 (1)309.

Lahelma, E., Lallukka, T., Laaksonen, M., Martikainen, P., Rahkonen, O., Chandola, T., Head, J., Marmot, M., Kagamimori, S. & Tatsuse, T. 2010. Social class differences in health behaviours among employees from Britain, Finland and Japan: The influence of psychosocial factors. Health & place, 16 (1)61-70.

Lahti, J., Laaksonen, M., Lahelma, E. & Rahkonen, O. 2010. The impact of physical activity on sickness absence. Scandinavian journal of medicine & science in sports, 20 (2)191-199.

Lahti, J., Lahelma, E. & Rahkonen, O. 2012. Changes in leisure-time physical activity and subsequent sickness absence: A prospective cohort study among middle-aged employees. Preventive medicine, 55 (6)618-622.

Laine, S., Gimeno, D., Virtanen, M., Oksanen, T., Vahtera, J., Elovainio, M., Koskinen, A., Pentti, J. & Kivimäki, M. 2009. Job strain as a predictor of disability pension: the Finnish Public Sector Study. Journal of epidemiology and community health, 63 (1)24-30.

Laitinen-Krispijn, S. & Bijl, R. 2000. Mental disorders and employee sickness absence: the NEMESIS study. Social psychiatry and psychiatric epidemiology, 35 (2)71-77.

Lalić, H. & Hromin, M. 2012. Presenteeism Towards Absenteeism: Manual Work Versus Sedentary Work, Private Versus Governmental–A Croatian Review. Collegium Antropologicum, 36 (1)111-116.

Lallukka, T., Haaramo, P., Lahelma, E. & Rahkonen, O. 2011. Sleep problems and disability retirement: a register-based follow-up study. American journal of epidemiology, 173 (8)871-881.

Lallukka, T., Sarlio-Lähteenkorva, S., Roos, E., Laaksonen, M., Rahkonen, O. & Lahelma, E. 2004. Working conditions and health behaviours among employed women and men: the Helsinki Health Study. Preventive medicine, 38 (1)48-56.

Lambert, E. G., Edwards, C., Camp, S. D. & Saylor, W. G. 2005. Here today, gone tomorrow, back again the next day: Antecedents of correctional absenteeism. Journal of Criminal Justice, 33 (2)165-175.

Landis, J. R. & Koch, G. G. 1977. The measurement of observer agreement for categorical data. biometrics, 159-174.

Landsbergis, P., Theorell, T., Schwartz, J., Greiner, B. & Krause, N. 1999. Measurement of psychosocial workplace exposure variables. Occupational medicine (Philadelphia, Pa.), 15 (1)163-188.

Landsbergis, P. A., Schnall, P. L., Deitz, D., Friedman, R. & Pickering, T. 1992. The patterning of psychological attributes and distress by "job strain" and social support in a sample of working men. Journal of behavioral medicine, 15 (4)379-405.

Larsen, M. & Fakultet, E. 2004. Retaining older workers in the Danish labour market. Faculty of Business Administration, Aarhus School of Business.

Larsson, T. J. & Björnstig, U. 1995. Persistent medical problems and permanent impairment five years after occupational injury. Scandinavian Journal of Public Health, 23 (2)121-128.

Lawlor, D. A. & Hopker, S. W. 2001. The effectiveness of exercise as an intervention in the management of depression: systematic review and meta-regression analysis of randomised controlled trials. BMJ: British Medical Journal, 322 (7289)763.

Lawson, K. 1991. What happened to normal retirement age. Employee Benefit Plan Review, 46 (1)12-15.

Leaf, P. J. & Bruce, M. L. 1987. Gender differences in the use of mental health-related services: a re-examination. Journal of Health and Social Behavior, 171-183.

Lechner, L. & de Vries, H. 1997. Effects of an employee fitness program on reduced absenteeism. Journal of occupational and environmental medicine, 39 (9)827-831.

Leigh, J. P. 1986. Correlates of absence from work due to illness. Human Relations.

Leigh, J. P. 1996. Smoking, self-selection and absenteeism. The Quarterly Review of Economics and Finance, 35 (4)365-386.

Leijon, M., Hensing, G. & Alexanderson, K. 2004. Sickness absence due to musculoskeletal diagnoses: association with occupational gender segregation. Scandinavian journal of public health, 32 (2)94-101.

Leinonen, T., Martikainen, P. & Lahelma, E. 2012. Interrelationships between education, occupational social class, and income as determinants of disability retirement. Scandinavian journal of public health, 40 (2)157-166.

Leinonen, T., Pietilainen, O., Laaksonen, M., Rahkonen, O., Lahelma, E. & Martikainen, P. 2011. Occupational social class and disability retirement among municipal employees—the contribution of health behaviors and working conditions. Scandinavian journal of work, environment & health, 37 (6)464-472.

Leka, S. G., A. and Cox, T. 2003. Protecting workers health series 3' [online] available from http://www.who.int/occupational_health/publications/en/oehstress.pdf. [Accessed on 20/05/2015].

Lesuffleur, T., Chastang, J. F., Sandret, N. & Niedhammer, I. 2014. Psychosocial factors at work and sickness absence: results from the French National SUMER Survey. American journal of industrial medicine, 57 (6)695-708.

Li, J., Yang, W., Liu, P., XU, Z. & CHO, S.-I. 2004. Psychometric evaluation of the Chinese (mainland) version of Job Content Questionnaire: a study in university hospitals. Industrial health, 42 (2)260-267.

Lichtenstein, R. L. 1984. Review Article: The Job Satisfaction and Retention of Physicians in Organized Settings: a Literature Review. Medical Care Research and Review, 41 (3)139-179.

Lim, A., Chongsuvivatwong, V., Geater, A., Chayaphum, N. & Thammasuwan, U. 2002. Influence of work type on sickness absence among personnel in a teaching hospital. Journal of occupational health, 44 (4)254-263.

Lindholm, C., Burström, B. & Diderichsen, F. 2002. Class differences in the social consequences of illness? Journal of epidemiology and community health, 56 (3)188-192.

Lindström, I., Öhlund, C., Eek, C., Wallin, L., Peterson, L.-E., Fordyce, W. E. & Nachemson, A. L. 1992. The effect of graded activity on patients with subacute low back pain: a randomized prospective clinical study with an operant-conditioning behavioral approach. Physical therapy, 72 (4)279-290.

Lindström, M., Hanson, B. S. & Östergren, P.-O. 2001. Socioeconomic differences in leisure-time physical activity: the role of social participation and social capital in shaping health related behaviour. Social Science & Medicine, 52 (3)441-451.

Loomis, D., Wolf, S. H., Runyan, C. W., Marshall, S. W. & Butts, J. D. 2001. Homicide on the job: workplace and community determinants. American Journal of Epidemiology, 154 (5)410-417.

Lund, T. & Csonka, A. 2003. Risk factors in health, work environment, smoking status, and organizational context for work disability. American journal of industrial medicine, 44 (5)492-501.

Lund, T., Iversen, L. & Poulsen, K. B. 2001. Work environment factors, health, lifestyle and marital status as predictors of job change and early retirement in physically heavy occupations. American journal of industrial medicine, 40 (2)161-169.

Lund, T., Kivimäki, M., Labriola, M., Villadsen, E. & Christensen, K. B. 2007. Using administrative sickness absence data as a marker of future disability pension: the prospective DREAM study of Danish private sector employees. Occupational and environmental medicine, 65 (1)28-31.

Lund, T. & Villadsen, E. 2005. Who retires early and why? Determinants of early retirement pension among Danish employees 57–62 years. European Journal of Ageing, 2 (4)275-280.

Lundborg, P. 2007. Does smoking increase sick leave? Evidence using register data on Swedish workers. Tobacco control, 16 (2)114-118.

Ma, C. C., Andrew, M. E., Fekedulegn, D., Gu, J. K., Hartley, T. A., Charles, L. E., Violanti, J. M. & Burchfiel, C. M. 2015. Shift Work and Occupational Stress in Police Officers. Safety and health at work, 6 (1)25-29.

Macfarlane, G. J., Pallewatte, N., Paudyal, P., Blyth, F. M., Coggon, D., Crombez, G., Linton, S., Leino-Arjas, P., Silman, A. J. & Smeets, R. J. 2009. Evaluation of work-related psychosocial factors and regional musculoskeletal pain: results from a EULAR Task Force. Annals of the rheumatic diseases, 68 (6)885-891.

Mackenzie, E. J., Morris Jr, J. A., Jurkovich, G. J., Yasui, Y., Cushing, B., Burgess, A., DeLateur, B., McAndrew, M. & Swiontkowski, M. 1998. Return to work following injury: the role of economic, social, and job-related factors. American journal of public health, 88 (11)1630-1637.

Magee, C., Stefanic, N., Caputi, P. & Iverson, D. 2011. Occupational factors and sick leave in Australian employees. Journal of occupational and environmental medicine, 53 (6)627-632.

Magnavita, N. & Garbarino, S. 2013. Is Absence Related to Work Stress? A Repeated Cross‐Sectional Study on a Special Police Force. American journal of industrial medicine, 56 (7)765-775.

Mäkelä, P., Paljärvi, T. & Poikolainen, K. 2005. Heavy and nonheavy drinking occasions, all-cause and cardiovascular mortality and hospitalizations: a follow-up study in a population with a low consumption level. Journal of Studies on Alcohol and Drugs, 66 (6)722.

Mansson, N.O., Eriksson, K.-F., Israelsson, B., Ranstam, J., Melander, A. & Råstam, L. 1996. Body mass index and disability pension in middle-aged men—non-linear relations. International journal of epidemiology, 25 (1)80-85.
Månsson, N.-O., Råstam, L., Eriksson, K.-F. & Israelsson, B. 1998. Socioeconomic inequalities and disability pension in middle-aged men. International journal of epidemiology, 27 (6)1019-1025.
Månsson, N.-O., Råstam, L., Eriksson, K.-F. & Israelsson, B. 1999. Alcohol consumption and disability pension among middle-aged men. Annals of epidemiology, 9 (6)341-348.
Månsson, N.-O., Råstam, L., Eriksson, K.-F., Israelsson, B. & Melander, A. 1994. Incidence of and reasons for disability pension in a Swedish cohort of middle-aged men. The European Journal of Public Health, 4 (1)22-26.
Mäntyniemi, A., Oksanen, T., Salo, P., Virtanen, M., Sjösten, N., Pentti, J., Kivimäki, M. & Vahtera, J. 2012. Job strain and the risk of disability pension due to musculoskeletal disorders, depression or coronary heart disease: a prospective cohort study of 69 842 employees. Occupational and environmental medicine, 69 (8)574-581.
Marin, B. & Prinz, C. 2003. Facts and figures on disability welfare. European Centre for Social Welfare Policy and Research.
Mark, G. & Smith, A. P. 2012. Occupational stress, job characteristics, coping, and the mental health of nurses. British journal of health psychology, 17 (3)505-521.
Markey, R., Ravenswood, K. & Webber, D. J. 2012. The impact of the quality of the work environment on employees' intention to quit.
Marmot, M., Feeney, A., Shipley, M., North, F. & Syme, S. 1995. Sickness absence as a measure of health status and functioning: from the UK Whitehall II study. Journal of Epidemiology and Community Health, 49 (2)124-130.
Marmot, M. G., North, F., Feeney, A. & Head, J. 1993. Alcohol consumption and sickness absence: from the Whitehall II study. Addiction, 88 (3)369-382.
Marmot, M. G., Stansfeld, S., Patel, C., North, F., Head, J., White, I., Brunner, E., Feeney, A., Marmot, M. & Smith, G. D. 1991. Health inequalities among British civil servants: the Whitehall II study. The Lancet, 337 (8754)1387-1393.
Martikainen, P., Lahelma, E., Marmot, M., Sekine, M., Nishi, N. & Kagamimori, S. 2004. A comparison of socioeconomic differences in physical functioning and perceived health among male and female employees in Britain, Finland and Japan. Social Science & Medicine, 59 (6)1287-1295.
Mastekaasa, A. 2000. Parenthood, gender and sickness absence. Social Science & Medicine, 50 (12)1827-1842.
Mastekaasa, A. & Dale-Olsen, H. 2000. Do women or men have the less healthy jobs? An analysis of gender differences in sickness absence. European Sociological Review, 16 (3)267-286.
McCaughey, D., McGhan, G., DelliFraine, J. L. & Brannon, S. D. 2011. Perception is reality: How patients contribute to poor workplace safety perceptions. Health care management review, 36 (1)18-27.
McGhee, S. M., Adab, P., Hedley, A. J., Lam, T. H., Ho, L. M., Fielding, R. & Wong, C. M. 2000. Passive smoking at work: the short-term cost. Journal of Epidemiology and Community Health, 54 (9)673-676.
Mein, G., Martikainen, P., Stansfeld, S. A., Brunner, E. J., Fuhrer, R. & Marmot, M. G. 2000. Predictors of early retirement in British civil servants. Age and ageing, 29 (6)529-536.
Meisinger, C., Heier, M. & Loewel, H. 2005. Sleep disturbance as a predictor of type 2 diabetes mellitus in men and women from the general population. Diabetologia, 48 (2)235-241.

Melamed, S., Ben-Avi, I., Luz, J. & Green, M. S. 1995. Objective and subjective work monotony: Effects on job satisfaction, psychological distress, and absenteeism in blue-collar workers. Journal of Applied Psychology, 80 (1)29.

Melamed, S., Luz, J., Najenson, T., Jucha, E. & Green, M. 1989. Ergonomic stress levels, personal characteristics, accident occurrence and sickness absence among factory workers. Ergonomics, 32 (9)1101-1110.

Melchior, M., Krieger, N., Kawachi, I., Berkman, L. F., Niedhammer, I. & Goldberg, M. 2005. Work factors and occupational class disparities in sickness absence: findings from the GAZEL cohort study. American Journal of Public Health, 95 (7).

Mensink, G. B., Loose, N. & Oomen, C. M. 1997. Physical activity and its association with other lifestyle factors. European Journal of Epidemiology, 13 (7)771-778.

Merkus, S. L., Van Drongelen, A., Holte, K. A., Labriola, M., Lund, T., Van Mechelen, W. & Van Der Beek, A. J. 2012. The association between shift work and sick leave: a systematic review. Occupational and environmental medicine, 69 (10)701-712.

Milton, D. K., Glencross, P. M. & Walters, M. D. 2000. Risk of sick leave associated with outdoor air supply rate, humidification, and occupant complaints. Indoor Air, 10 (4)212-221.

Mirowsky, J. & Ross, C. E. 1995. Sex differences in distress: Real or artifact? American Sociological Review, 449-468.

Mitchell, J. M. & Anderson, K. H. 1989. Mental health and the labor force participation of older workers. Inquiry, 262-271.

Møller Danø, A., Ejrnæs, M. & Husted, L. 2005. Do single women value early retirement more than single men? Labour Economics, 12 (1)47-71.

Moncada, S., Navarro, A., Cortès, I., Molinero, E. & Artazcoz, L. 2002. Sickness leave, administrative category and gender: results from the" Casa Gran'project. Scandinavian journal of public health, 30 (59 suppl)26-33.

Moreau, M., Valente, F., Mak, R., Pelfrene, E., De Smet, P., De Backer, G. & Kornitzer, M. 2004A. Occupational stress and incidence of sick leave in the Belgian workforce: the Belstress study. Journal of Epidemiology and Community Health, 58 (6)507-516.

Moreau, M., Valente, F., Mak, R., Pelfrene, E., De Smet, P., De Backer, G. & Kornitzer, M. 2004B. Obesity, body fat distribution and incidence of sick leave in the Belgian workforce: the Belstress study. International Journal of Obesity, 28 (4)574-582.

Morikawa, Y., Martikainen, P., Head, J., Marmot, M., Ishizaki, M. & Nakagawa, H. 2004. A comparison of socio-economic differences in long-term sickness absence in a Japanese cohort and a British cohort of employed men. The European Journal of Public Health, 14 (4)413-416.

Morren, M., Dirkzwager, A. J., Kessels, F. J. & Yzermans, C. J. 2007. The influence of a disaster on the health of rescue workers: a longitudinal study. Canadian Medical Association Journal, 176 (9)1279-1283.

Morrow, P. C. 1982. Human resource planning and the older worker: Developing a retirement intentions model. Journal of Organizational Behavior, 3 (3)253-261.

Moussavi, S., Chatterji, S., Verdes, E., Tandon, A., Patel, V. & Ustun, B. 2007. Depression, chronic diseases, and decrements in health: results from the World Health Surveys. The Lancet, 370 (9590)851-858.

Muchinsky, P. M. 1977. Employee absenteeism: A review of the literature. Journal of Vocational Behavior, 10 (3)316-340.

Mykletun, A., Heradstveit, O., Eriksen, K., Glozier, N., Øverland, S., Mæland, J. G. & Wilhelmsen, I. 2009. Health anxiety and disability pension award: The HUSK Study. Psychosomatic medicine, 71 (3)353-360.

Narbro, K., Ågren, G., Jonsson, E., Larsson, B., Näslund, I., Wedel, H. & Sjöström, L. 1999. Sick leave and disability pension before and after treatment for obesity: a report from the Swedish Obese Subjects (SOS) study. International Journal of Obesity & Related Metabolic Disorders, 23 (6).

Narbro, K., Jonsson, E., Larsson, B., Waaler, H., Wedel, H. & Sjöström, L. 1996. Economic consequences of sick-leave and early retirement in obese Swedish women. International journal of obesity, 20 (10)895-903.

National Law Enforcement Memorial Fund 2014. Latest Memorial Fund Fatalities Report. [Online] Available from: . http://www.nleomf.org/facts/research-bulletins/ [Accessed on 10/01/2014].

Naumanen, P. 2006. The health promotion model as assessed by ageing workers. Journal of clinical nursing, 15 (2)219-226.

Nazroo, J. Y., Edwards, A. C. & Brown, G. W. 1998. Gender differences in the prevalence of depression: artefact, alternative disorders, biology or roles? Sociology of Health & Illness, 20 (3)312-330.

Neacșiu, C. M. 2013. Predictors of early retirement thoughts and intent to work after retirement. Psihologia Resurselor Umane, 11 (2)96.

Neovius, K., Johansson, K., Kark, M. & Neovius, M. 2009. Obesity status and sick leave: a systematic review. Obesity reviews, 10 (1)17-27.

Neovius, K., Johansson, K., Rössner, S. & Neovius, M. 2008. Disability pension, employment and obesity status: a systematic review. Obesity Reviews, 9 (6)572-581.

Niedhammer, I. 2002. Psychometric properties of the French version of the Karasek Job Content Questionnaire: a study of the scales of decision latitude, psychological demands, social support, and physical demands in the GAZEL cohort. International archives of occupational and environmental health, 75 (3)129-144.

Niedhammer, I., Bugel, I., Goldberg, M., Leclerc, A. & Guéguen, A. 1998. Psychosocial factors at work and sickness absence in the Gazel cohort: a prospective study. Occupational and environmental medicine, 55 (11)735-741.

Niedhammer, I., Chastang, J.-F. & David, S. 2008. Importance of psychosocial work factors on general health outcomes in the national French SUMER survey. Occupational medicine, 58 (1)15-24.

Niedhammer, I., Chastang, J.-F., Sultan-Taïeb, H., Vermeylen, G. & Parent-Thirion, A. 2013. Psychosocial work factors and sickness absence in 31 countries in Europe. The European Journal of Public Health, 23 (4)622-629.

Nielsen, M. L., Rugulies, R., Christensen, K. B., Smith-Hansen, L. & Kristensen, T. S. 2006. Psychosocial work environment predictors of short and long spells of registered sickness absence during a 2-year follow up. Journal of occupational and environmental medicine, 48 (6)591-598.

Nilsson, P. M., Rööst, M., Engström, G., Hedblad, B. & Berglund, G. 2004. Incidence of diabetes in middle-aged men is related to sleep disturbances. Diabetes Care, 27 (10)2464-2469.

Nirkko, O., Lauroma, M., Siltanen, P., Tuominen, H. & Vanhala, K. 1982. Psychological risk factors related to coronary heart disease. Prospective studies among policemen in Helsinki. Acta Medica Scandinavica, 211 (S660)137-146.

Norström, T. 2006. Per capita alcohol consumption and sickness absence. Addiction, 101 (10)1421-1427.

North, F., Syme, S. L., Feeney, A., Head, J., Shipley, M. J. & Marmot, M. G. 1993. Explaining socioeconomic differences in sickness absence: the Whitehall II Study. BMJ: British Medical Journal, 306 (6874)361.

North, F. M., Syme, S. L., Feeney, A., Shipley, M. & Marmot, M. 1996. Psychosocial work environment and sickness absence among British civil servants: the Whitehall II study. American Journal of Public Health, 86 (3)332-340.

Nunnally, J. C., Bernstein, I. H. & Berge, J. M. t. 1994. Psychometric theory. McGraw-Hill New York.

Nyberg, A., Westerlund, H., Hanson, L. L. M. & Theorell, T. 2008. Managerial leadership is associated with self-reported sickness absence and sickness presenteeism among Swedish men and women. Scandinavian journal of public health, 36 (8)803-811.

Ockander, M. & Timpka, T. 2001. A female lay perspective on the establishment of long‐term sickness absence. International Journal of Social Welfare, 10 (1)74-79.

Ockander, M. K. & Timpka, T. 2003. Women's experiences of long term sickness absence: implications for rehabilitation practice and theory. Scandinavian journal of public health, 31 (2)143-148.

Odeen, M., Magnussen, L., Maeland, S., Larun, L., Eriksen, H. & Tveito, T. 2013. Systematic review of active workplace interventions to reduce sickness absence. Occupational medicine, 63 (1)7-16.

Office of National Statistics 2015 Full Report: Sickness Absence in the Labour Market, February 2014' [online] available from http://www.ons.gov.uk/ons/rel/lmac/sickness-absence-in-the-labour-market/2014/rpt---sickness-absence-in-the-labour-market.html#tab-Sickness-Absence-in-the-Labour-Market [Accessed on 20/05/2015].

Ohayon, M. M., Lemoine, P., Arnaud-Briant, V. & Dreyfus, M. 2002. Prevalence and consequences of sleep disorders in a shift worker population. Journal of psychosomatic research, 53 (1)577-583.

Oliver, G. & Wardle, J. 1999. Perceived effects of stress on food choice. Physiology & behavior, 66 (3)511-515.

Oliver, G., Wardle, J. & Gibson, E. L. 2000. Stress and food choice: a laboratory study. Psychosomatic medicine, 62 (6)853-865.

Oliver, M. I., Pearson, N., Coe, N. & Gunnell, D. 2005. Help-seeking behaviour in men and women with common mental health problems: cross-sectional study. The British Journal of Psychiatry, 186 (4)297-301.

Østby, K. A., Ørstavik, R. E., Knudsen, A. K., Reichborn-Kjennerud, T. & Mykletun, A. 2011. Health problems account for a small part of the association between socioeconomic status and disability pension award. Results from the Hordaland Health Study. BMC public health, 11 (1)12.

Østbye, T., Dement, J. M. & Krause, K. M. 2007. Obesity and workers' compensation: results from the Duke Health and Safety Surveillance System. Archives of Internal Medicine, 167 (8)766-773.

Otsuka, Y., Takahashi, M., Nakata, A., Haratani, T., Kaida, K., Fukasawa, K., Hanada, T. & Ito, A. 2007. Sickness absence in relation to psychosocial work factors among daytime workers in an electric equipment manufacturing company. Industrial health, 45 (2)224-231.

Ovuga, E. & Madrama, C. 2006. Burden of alcohol use in the Uganda Police in Kampala District. African health sciences, 6 (1)14-20.

Palumbo, M. V., Rambur, B., McIntosh, B. & Naud, S. 2010. Registered nurses' perceptions of health and safety related to their intention to leave. AAOHN Journal, 58 (3)95-103.

Paluska, S. A. & Schwenk, T. L. 2000. Physical activity and mental health. Sports Medicine, 29 (3)167-180.

Paradise, M. B., Naismith, S. L., Davenport, T. A., Hickie, I. B. & Glozier, N. S. 2012. The impact of gender on early ill-health retirement in people with heart disease and depression. Australian and New Zealand Journal of Psychiatry, 46 (3)249-256.

Parkes, K. R., Mendham, C. A. & von Rabenau, C. 1994. Social support and the demand–discretion model of job stress: Tests of additive and interactive effects in two samples. Journal of Vocational Behavior, 44 (1)91-113.

Parrott, A. C. 1999. Does cigarette smoking< em> cause stress? American Psychologist, 54 (10)817.

Pelfrene, E., Vlerick, P., Mak, R. P., De Smet, P., Kornitzer, M. & De Backer, G. 2001. Scale reliability and validity of the Karasek'Job Demand-Control-Support'model in the Belstress study. Work & Stress, 15 (4)297-313.

Perryer, C., Jordan, C., Firns, I. & Travaglione, A. 2010. Predicting turnover intentions: The interactive effects of organizational commitment and perceived organizational support. Management Research Review, 33 (9)911-923.

Persson, G., Danielsson, M., Rosén, M., Alexanderson, K., Lundberg, O., Lundgren, B., Stenbeck, M. & Wall, S. 2006. Health in Sweden: The National Public Health Report 2005. Scandinavian journal of public health.

Pesch, B., Harth, V., Rabstein, S., Baisch, C., Schiffermann, M., Pallapies, D., Bonberg, N., Heinze, E., Spickenheuer, A. & Justenhoven, C. 2010. Night work and breast cancer-results from the German GENICA study. Scandinavian journal of work, environment & health, 36 (2).

Peter, R. & Siegrist, J. 1997. Chronic work stress, sickness absence, and hypertension in middle managers: General or specific sociological explanations? Social Science & Medicine, 45 (7)1111-1120.

Petersson, J., Edén, L. & Ejlertsson, G. 1999. Quality of life among early retirees. Experimental Aging Research, 25.

Phd, J. B., Campbell, E. A. & Fife‐Schaw, C. 1995. Adverse impacts experienced by police officers following exposure to sex discrimination and sexual harassment. Stress medicine, 11 (1)221-228.

Phillips, B., Magan, L., Gerhardstein, C., & Cecil, B.. 1991. Shift work, sleep quality, and worker health: a study of police officers. Southern medical journal, 84 (10)1176-1196.

Piault, E., Doshi, S., Brandt, B. A., Angün, Ç., Evans, C. J., Bergqvist, A. & Trocio, J. 2012. Linguistic validation of translation of the self-assessment goal achievement (saga) questionnaire from English. Health Qual Life Outcomes, 10 40.

Pienaar, J., Rothmann, S. & Van De Vijver, F. J. 2007. Occupational stress, personality traits, coping strategies, and suicide ideation in the South African Police Service. Criminal Justice and Behavior, 34 (2)246-258.

Pienta, A. M. 2003. Partners in marriage: An analysis of husbands' and wives' retirement behavior. Journal of Applied Gerontology, 22 (3)340-358.

Pienta, A. M. & Hayward, M. D. 2002. Who expects to continue working after age 62? The retirement plans of couples. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 57 (4)S199-S208.

Pietiläinen, O., Laaksonen, M., Rahkonen, O. & Lahelma, E. 2011. Self-rated health as a predictor of disability retirement–the contribution of ill-health and working conditions. PLoS One, 6 (9)e25004.

Piirainen, H., Räsänen, K. & Kivimäki, M. 2003. Organizational climate, perceived work-related symptoms and sickness absence: a population-based survey. Journal of occupational and environmental medicine, 45 (2)175-184.

Pines, A., Skulkeo, K., Pollak, E., Peritz, E. & Steif, J. 1985. Rates of sickness absenteeism among employees of a modern hospital: the role of demographic and occupational factors. British journal of industrial medicine, 42 (5)326-335.

Pit, S. W., Shrestha, R., Schofield, D. & Passey, M. 2010. Health problems and retirement due to ill-health among Australian retirees aged 45–64 years. Health Policy, 94 (2)175-181.
Pitchaya Phakthongsuk, M. 2009. Construct validity of the Thai version of the job content questionnaire in a large population of heterogeneous occupations. J Med Assoc Thai, 92 (4)564-72.
Polvinen, A., Gould, R., Lahelma, E. & Martikainen, P. 2013. Socioeconomic differences in disability retirement in Finland: The contribution of ill-health, health behaviours and working conditions. Scandinavian journal of public health, 41 (5)470-478.
Prinz, C. 2003. European disability pension policies: 11 country trends, 1970-2002. Ashgate Pub Ltd.
Proper, K., Van der Beek, A., Hildebrandt, V., Twisk, J. & Van Mechelen, W. 2004. Worksite health promotion using individual counselling and the effectiveness on sick leave; results of a randomised controlled trial. Occupational and environmental medicine, 61 (3)275-279.
Puhl, R. M., Moss-Racusin, C. A., Schwartz, M. B. & Brownell, K. D. 2008. Weight stigmatization and bias reduction: perspectives of overweight and obese adults. Health education research, 23 (2)347-358.
Rael, E., Stansfeld, S. A., Shipley, M., Head, J., Feeney, A. & Marmot, M. 1995. Sickness absence in the Whitehall II study, London: the role of social support and material problems. Journal of Epidemiology and Community Health, 49 (5)474-481.
Rahkonen, O., Laaksonen, M., Martikainen, P., Roos, E. & Lahelma, E. 2006. Job control, job demands, or social class? The impact of working conditions on the relation between social class and health. Journal of epidemiology and community health, 60 (1)50-54.
Rajaratnam, S. M., Barger, L. K., Lockley, S. W., Shea, S. A., Wang, W., Landrigan, C. P., O'Brien, C. S., Qadri, S., Sullivan, J. P. & Cade, B. E. 2011. Sleep disorders, health, and safety in police officers. Jama, 306 (23)2567-2578.
Rebergen, D. S., Bruinvels, D. J., Bezemer, P. D., van der Beek, A. J. & Van Mechelen, W. 2009. Guideline-based care of common mental disorders by occupational physicians (CO-OP study): a randomized controlled trial. Journal of occupational and environmental medicine, 51 (3)305-312.
Reed, D., Lacroix, A.Z., Karasek, R., Miller, D., & Maclean, C. A. 1989. Occupational strain and the incidence of coronary heart disease. American Journal of Epidemiology, 129 (3)495-502.
Rehm, J., Rehm, J., Taylor, B., Rehm, J., Taylor, B., Room, R., Rehm, J., Taylor, B. & Room, R. 2006. Global burden of disease from alcohol, illicit drugs and tobacco. Drug and alcohol review, 25 (6)503-513.
Reinhardt, J. D., Wahrendorf, M. & Siegrist, J. 2013. Socioeconomic position, psychosocial work environment and disability in an ageing workforce: a longitudinal analysis of SHARE data from 11 European countries. Occupational and environmental medicine, 70 (3)156-163.
Reitzes, D. C., Mutran, E. J. & Fernandez, M. E. 1998. The decision to retire: A career perspective. Social Science Quarterly.
Representatives, T. U. 2003. Protecting workers health; Series No 3.
Revicki, D. A., Irwin, D., Reblando, J. & Simon, G. E. 1994. The accuracy of self-reported disability days. Medical care, 32 (4)401-404.
Reviere, R. & Young, V. D. 1994. Mortality of police officers: Comparisons by length of time on the force. Am. J. Police, 13 51.

Rhoades, L. & Eisenberger, R. 2002. Perceived organizational support: a review of the literature. Journal of applied psychology, 87 (4)698.
Rhodes, S. R. & Steers, R. M. 1990. Managing employee absenteeism. Addison-Wesley Reading, MA.
Rice, N. E., Lang, I. A., Henley, W. & Melzer, D. 2011. Common health predictors of early retirement: findings from the English Longitudinal Study of Ageing. Age and ageing, 40 (1)54-61.
Roberts, C. S., Cox, C. E., Shannon, V. J. & Wells, N. L. 1994. A closer look at social support as a moderator of stress in breast cancer. Health & Social Work, 19 (3)157-164.
Robins, L. N. & Regier, D. A. 1991. Psychiatric disorders in America: the epidemiologic catchment area study. Free Press.
Robroek, S. J., Reeuwijk, K. G., Hillier, F. C., Bambra, C. L., van Rijn, R. M. & Burdorf, A. 2013A. The contribution of overweight, obesity, and lack of physical activity to exit from paid employment: a meta-analysis. Scandinavian journal of work, environment & health, 39 (3)233-240.
Robroek, S. J., Schuring, M., Croezen, S., Stattin, M. & Burdorf, A. 2013B. Poor health, unhealthy behaviors, and unfavorable work characteristics influence pathways of exit from paid employment among older workers in Europe: a four year follow-up study. Scandinavian journal of work, environment & health, 39 (2)125-133.
Røed, K. & Fevang, E. 2007. Organizational change, absenteeism, and welfare dependency. Journal of Human Resources, 42 (1)156-193.
Roelen, C., Koopmans, P., Bültmann, U., Groothoff, J. & Van Der Klink, J. 2009. Psychosocial work conditions and registered sickness absence: a 3-year prospective cohort study among office employees. International archives of occupational and environmental health, 82 (9)1107-1113.
Roelen, C. A., Koopmans, P. C., de Graaf, J. H., van Zandbergen, J. W. & Groothoff, J. W. 2007. Job demands, health perception and sickness absence. Occupational medicine, 57 (7)499-504.
Roelen, C. A., Koopmans, P. C., Notenbomer, A. & Groothoff, J. W. 2008A. Job satisfaction and sickness absence: a questionnaire survey. Occupational Medicine, 58 (8)567-571.
Roelen, C. A., van der Pol, T. R., Koopmans, P. C. & Groothoff, J. W. 2006. Identifying workers at risk of sickness absence by questionnaire. Occupational medicine, 56 (7)442-446.
Roelen, C. A., Weites, S. H., Koopmans, P. C., van der Klink, J. J. & Groothoff, J. W. 2008B. Sickness absence and psychosocial work conditions: a multilevel study. Occupational medicine, 58 (6)425-430.
Ropponen, A., Samuelsson, Å., Alexanderson, K. & Svedberg, P. 2013. Register-based data of psychosocial working conditions and occupational groups as predictors of disability pension due to musculoskeletal diagnoses: a prospective cohort study of 24 543 Swedish twins. BMC musculoskeletal disorders, 14 (1)268.
Rose, S. & van der Laan, M. J. 2008. Why match? Investigating matched case-control study designs with causal effect estimation.
Rothenbacher, D., Brenner, H., Arndt, V., Fraisse, E., Zschenderlein, B. & Fliedner, T. M. 1997. Disorders of the back and spine in construction workers: prevalence and prognostic value for disability. Spine, 22 (13)1481-1486.
Rothman, K. J., Greenland, S. & Lash, T. L. 2008. Modern epidemiology. Wolters Kluwer Health.
Rugulies, R., Christensen, K. B., Borritz, M., Villadsen, E., Bültmann, U. & Kristensen, T. S. 2007. The contribution of the psychosocial work environment to sickness absence in

human service workers: Results of a 3-year follow-up study. Work & Stress, 21 (4)293-311.
Ruhm, C. J. 2000. Are recessions good for your health? The Quarterly Journal of Economics, 115 (2)617-650.
Ruidavets, J.-B., Ducimetière, P., Evans, A., Montaye, M., Haas, B., Bingham, A., Yarnell, J., Amouyel, P., Arveiler, D. & Kee, F. 2010. Patterns of alcohol consumption and ischaemic heart disease in culturally divergent countries: the Prospective Epidemiological Study of Myocardial Infarction (PRIME). BMJ: British Medical Journal, 341.
Salo, P., Oksanen, T., Sivertsen, B., Hall, M., Pentti, J., Virtanen, M., Vahtera, J. & Mika, K. 2010. Sleep disturbances as a predictor of cause-specific work disability and delayed return to work. Sleep, 33 (10)1323.
Salonen, P., Arola, H., Nygård, C. H., Huhtala, H. & Koivisto, A. M. 2003. Factors associated with premature departure from working life among ageing food industry employees. Occupational medicine, 53 (1)65-68.
Salonsalmi, A., Laaksonen, M., Lahelma, E. & Rahkonen, O. 2009. Drinking habits and sickness absence: the contribution of working conditions. Scandinavian journal of public health, 37 (8)846-854.
Salonsalmi, A., Laaksonen, M., Lahelma, E. & Rahkonen, O. 2012. Drinking habits and disability retirement. Addiction, 107 (12)2128-2136.
Samuelsson, Å., Ropponen, A., Alexanderson, K. & Svedberg, P. 2012. Psychosocial working conditions, occupational groups, and risk of disability pension due to mental diagnoses: a cohort study of 43 000 Swedish twins. Scandinavian journal of work, environment & health.
Sandvik, L., Erikssen, G. & Thaulow, E. 1995. Long term effects of smoking on physical fitness and lung function: a longitudinal study of 1393 middle aged Norwegian men for seven years. BMJ: British Medical Journal, 311 (7007)715.
Sanne, B., Torp, S., Mykletun, A. & Dahl, A. A. 2005. The Swedish Demand—Control—Support Questionnaire (DCSQ): Factor structure, item analyses, and internal consistency in a large population. Scandinavian journal of public health, 33 (3)166-174.
SHARE study 2007. 'Questionnaire version 10 (manually edited April 2005)'. [online] Available from. http://www.share-project.org/t3/share/new_sites/Fragebogen/ma-Gene.pdf [Accessed on 15/05/2015].
Schaubroeck, J., Ganster, D. C. & Kemmerer, B. E. 1994. Job complexity,"Type A" behavior, and cardiovascular disorder: A prospective study. Academy of Management Journal, 37 (2)426-439.
Schernhammer, E. S., Laden, F., Speizer, F. E., Willett, W. C., Hunter, D. J., Kawachi, I. & Colditz, G. A. 2001. Rotating night shifts and risk of breast cancer in women participating in the nurses' health study. Journal of the National Cancer Institute, 93 (20)1563-1568.
Schils, T. 2008. Early retirement in Germany, the Netherlands, and the United Kingdom: A longitudinal analysis of individual factors and institutional regimes. European Sociological Review, 24 (3)315-329.
Schnall, P. L., Landsbergis, P. A. & Baker, D. 1994. Job strain and cardiovascular disease. Annual review of public health, 15 (1)381-411.
Schneider, S. & Becker, S. 2005. Prevalence of physical activity among the working population and correlation with work-related factors: results from the first German National Health Survey. Journal of occupational health, 47 (5)414-423.

Schreurs, B., Cuyper, N. D., Emmerik, I., Notelaers, G. & Witte, H. d. 2011. Job demands and resources and their associations with early retirement intentions through recovery need and work enjoyment. SA Journal of Industrial Psychology, 37 (2)63-73.

Schrijvers, C. T., van de Mheen, H. D., Stronks, K. & Mackenbach, J. P. 1998. Socioeconomic inequalities in health in the working population: the contribution of working conditions. International journal of epidemiology, 27 (6)1011-1018.

Schuring, M., Burdorf, L., Kunst, A. & Mackenbach, J. 2007. The effects of ill health on entering and maintaining paid employment: evidence in European countries. Journal of epidemiology and community health, 61 (7)597-604.

Schwartz, S., Anderson, W. M., Cole, S. R., Cornoni-Huntley, J., Hays, J. C. & Blazer, D. 1999. Insomnia and heart disease: a review of epidemiologic studies. Journal of psychosomatic research, 47 (4)313-333.

Scully, D., Kremer, J., Meade, M. M., Graham, R. & Dudgeon, K. 1998. Physical exercise and psychological well being: a critical review. British journal of sports medicine, 32 (2)111-120.

Sejbaek, C. S., Nexo, M. A. & Borg, V. 2012. Work-related factors and early retirement intention: a study of the Danish eldercare sector. The European Journal of Public Health.

Sejbaek, C. S., Nexo, M. A. & Borg, V. 2013. Work-related factors and early retirement intention: a study of the Danish eldercare sector. The European Journal of Public Health, 23 (4)611-616.

Serxner, S., Gold, D., Anderson, D. & Williams, D. 2001a. The impact of a worksite health promotion program on short-term disability usage. Journal of occupational and environmental medicine, 43 (1)25-29.

Serxner, S. A., Gold, D. B. & Bultman, K. K. 2001b. The impact of behavioral health risks on worker absenteeism. Journal of occupational and environmental medicine, 43 (4)347-354.

Shoukri, M., Asyali, M. & Donner, A. 2004. Sample size requirements for the design of reliability study: review and new results. Statistical Methods in Medical Research, 13 (4)251-271.

Sibbald, B., Bojke, C. & Gravelle, H. 2003. National survey of job satisfaction and retirement intentions among general practitioners in England. BMJ, 326 (7379)22.

Siegrist, J. 1996. Adverse health effects of high-effort/low-reward conditions. Journal of occupational health psychology, 1 (1)27.

Siegrist, J. & Cooper, C. 1998. Adverse health effects of effort-reward imbalance at work. Theories of organizational stress, 190-204.

Siegrist, J., Starke, D., Chandola, T., Godin, I., Marmot, M., Niedhammer, I. & Peter, R. 2004. The measurement of effort–reward imbalance at work: European comparisons. Social Science & Medicine, 58 (8)1483-1499.

Siegrist, J., Wahrendorf, M., von dem Knesebeck, O., Jürges, H. & Börsch-Supan, A. 2007. Quality of work, well-being, and intended early retirement of older employees—baseline results from the SHARE Study. The European Journal of Public Health, 17 (1)62-68.

Simons, K. V. & Jankowski, T. B. 2008. Factors influencing nursing home social workers' intentions to quit employment. Administration in Social Work, 32 (1)5-21.

Sindelar, J. L., Duchovny, N., Falba, T. A. & Busch, S. H. 2005. If smoking increases absences, does quitting reduce them? Tobacco control, 14 (2)99-105.

Sinokki, M., Hinkka, K., Ahola, K., Gould, R., Puukka, P., Lönnqvist, J. & Virtanen, M. 2010. Social support as a predictor of disability pension: the Finnish Health 2000 study. Journal of Occupational and Environmental Medicine, 52 (7)733-739.

Sinokki, M., Hinkka, K., Ahola, K., Koskinen, S., Kivimäki, M., Honkonen, T., Puukka, P., Klaukka, T., Lönnqvist, J. & Virtanen, M. 2009. The association of social support at work and in private life with mental health and antidepressant use: the Health 2000 Study. Journal of affective disorders, 115 (1)36-45.

Sivertsen, B., Overland, S., Neckelmann, D., Glozier, N., Krokstad, S., Pallesen, S., Nordhus, I. H., Bjorvatn, B. & Mykletun, A. 2006. The Long-term Effect of Insomnia on Work Disability The HUNT-2 Historical Cohort Study. American journal of epidemiology, 163 (11)1018-1024.

Sivertsen, B., Øverland, S., PALLESEN, S., Bjorvatn, B., Nordhus, I. H., Maeland, J. G. & Mykletun, A. 2009. Insomnia and long sleep duration are risk factors for later work disability. The Hordaland Health Study. Journal of sleep research, 18 (1)122-128.

Skogen, J. C., Knudsen, A. K., Mykletun, A., Nesvåg, S. & Øverland, S. 2012. Alcohol consumption, problem drinking, abstention and disability pension award. The Nord‐Trøndelag Health Study (HUNT). Addiction, 107 (1)98-108.

Smeby, L., Bruusgaard, D. & Claussen, B. 2009. Sickness absence: could gender divide be explained by occupation, income, mental distress and health? Scandinavian journal of public health, 37 (7)674-681.

Smedley, J., Egger, P., Cooper, C. & Coggon, D. 1997. Prospective cohort study of predictors of incident low back pain in nurses. Bmj, 314 (7089)1225.

Smulders, P. G. & Nijhuis, F. J. 1999. The job demands-job control model and absence behaviour: results of a 3-year longitudinal study. Work & Stress, 13 (2)115-131.

Soininen, H. 1995. The feasibility of worksite fitness programs and their effects on the health, physical capacity and work ability of aging police officers. University of Kuopio, Kuopio, Finland: Väitöskirja, 26.

Spak, F., Hensing, G. & Allebeck, P. 1998. Sick-leave in women with alcohol dependence or abuse: effects of additional psychiatric disorders. Social psychiatry and psychiatric epidemiology, 33 (12)613-619.

Speklé, E. M., Hoozemans, M. J., Blatter, B. M., Heinrich, J., van der Beek, A. J., Knol, D. L., Bongers, P. M. & van Dieën, J. H. 2010. Effectiveness of a questionnaire based intervention programme on the prevalence of arm, shoulder and neck symptoms, risk factors and sick leave in computer workers: a cluster randomised controlled trial in an occupational setting. BMC musculoskeletal disorders, 11 (1)99.

Spielberger, C. D., Westberry, L., Grier, K. & Greenfield, G. 1981. The police stress survey: Sources of stress in law enforcement. National Institute of Justice.

Staal, J. B., Hlobil, H., Twisk, J. W., Smid, T., Köke, A. r. J. & van Mechelen, W. 2004. Graded Activity for Low Back Pain in Occupational Health CareA Randomized, Controlled Trial. Annals of internal medicine, 140 (2)77-84.

Stansfeld, S. & Candy, B. 2006. Psychosocial work environment and mental health—a meta-analytic review. Scandinavian journal of work, environment & health, 443-462.

Stansfeld, S., Feeney, A., Head, J., Canner, R., North, F. & Marmot, M. 1995. Sickness absence for psychiatric illness: the Whitehall II Study. Social Science & Medicine, 40 (2)189-197.

Stansfeld, S., Head, J. & Ferrie, J. 1999A. Short-term disability, sickness absence, and social gradients in the Whitehall II study. International journal of law and psychiatry, 22 (5)425-439.

Stansfeld, S. A., Fuhrer, R., Head, J., Ferrie, J. & Shipley, M. 1997. Work and psychiatric disorder in the Whitehall II Study. Journal of psychosomatic research, 43 (1)73-81.

Stansfeld, S. A., Fuhrer, R., Shipley, M. J. & Marmot, M. 1999B. Work characteristics predict psychiatric disorder: prospective results from the Whitehall II Study. Occupational and environmental medicine, 56 (5)302-307.

Stansfeld, S. A. & Marmot, M. G. 2002. Stress and the heart: Psychosocial pathways to coronary heart disease. BMJ books.

Statistics Centre of Abu Dhabi 2013A "Abu Dhabi in Figures 2011". [online] Available from: http://www.scad.ae/en/statistics/Pages/Statistics.aspx?ThemeID=3&TopicID=12&SubTopicID=44&PublicationID=58&DocumentID=70&ReturnPath=/SCADDocuments/Abu%20Dhabi%20in%20Figures%202011%20Eng.pdf [Accessed on 20/11/2013].

Statistics Centre of Abu Dhabi 2013B. "Abu Dhabi demographic and social indicators". [online] Available from http://www.scad.ae/SCADDocuments/Demographic%20and%20Social%20Indicators%20-%20Labour%20Force.pdf [Accessed on 20/11/2013].

Statistics Centre of Abu Dhabi 2015 "Explore Abu Dhabi Through Statistics 2015". [online] Available from: http://www.scad.ae/SCADDocuments/Explore%20Abu%20Dhabi-english.pdf [Accessed on 20/11/2013].

Stattin, M. & Järvholm, B. 2005. Occupation, work environment, and disability pension: a prospective study of construction workers. Scandinavian journal of public health, 33 (2)84-90.

Steenland, K. 1992. Passive smoking and the risk of heart disease. Jama, 267 (1)94-99.

Steenland, K., Johnson, J. & Nowlin, S. 1997. A follow-up study of job strain and heart disease among males in the NHANES 1 population. American journal of industrial medicine, 31 (2)256-259.

Stein, A. D., Shakour, S. K. & Zuidema, R. A. 2000. Financial incentives, participation in employer-sponsored health promotion, and changes in employee health and productivity: HealthPlus Health Quotient Program. Journal of occupational and environmental medicine, 42 (12)1148-1155.

Steinhardt, M., Greenhow, L. & Stewart, J. 1991. The relationship of physical activity and cardiovascular fitness to absenteeism and medical care claims among law enforcement officers. American Journal of Health Promotion, 5 (6)455-460.

Sterud, T. 2013. Work-related psychosocial and mechanical risk factors for work disability: a 3-year follow-up study of the general working population in Norway. Scandinavian journal of work, environment & health.

Sterud, T. 2014. Work-related mechanical risk factors for long-term sick leave: a prospective study of the general working population in Norway. The European Journal of Public Health, 24 (1)111-116.

Stone, A. A., Hedges, S. M., Neale, J. M. & Satin, M. S. 1985. Prospective and cross-sectional mood reports offer no evidence of a" blue Monday" phenomenon. Journal of Personality and Social Psychology, 49 (1)129.

Støver, M., Pape, K., Johnsen, R., Fleten, N., Sund, E. R., Ose, S. O. & Bjørngaard, J. H. 2013. Work environment and disability pension–an 18-year follow-up study in a Norwegian working population. Scandinavian journal of public health.

Strijk, J. E., Proper, K. I., van Stralen, M. M., Wijngaard, P., van Mechelen, W. & van der Beek, A. J. 2011. The role of work ability in the relationship between aerobic capacity and sick leave: a mediation analysis. Occupational and environmental medicine, 68 (10)753-758.

Summerfield, D. 2011. Metropolitan Police blues: protracted sickness absence, ill health retirement, and the occupational psychiatrist. BMJ, 342.

Sutinen, R., Kivimäki, M., Elovainio, M. & Forma, P. 2005. Associations between stress at work and attitudes towards retirement in hospital physicians. Work & Stress, 19 (2)177-185.

Svedberg, P. & Alexanderson, K. 2012. Associations between sickness absence and harassment, threats, violence, or discrimination: A cross-sectional study of the

Swedish Police. Work: A Journal of Prevention, Assessment and Rehabilitation, 42 (1)83-92.
Sverke, M., Hellgren, J. & Näswall, K. 2006. Job insecurity: A literature review. Arbetslivsinstitutet.
Szinovacz, M. E., Adams, G. & Beehr, T. 2003. Contexts and pathways: Retirement as institution, process, and experience. Retirement: Reasons, processes, and results, 6-52.
Szubert, Z. & Sobala, W. 2001. [Health reason for firefighters to leave their job]. Medycyna pracy, 53 (4)291-298.
Szubert, Z. & Sobala, W. 2002a. Health reason for firefighters to leave their job]. Medycyna pracy, 53 (4)291.
Szubert, Z. & Sobala, W. 2002b. [Sickness absence in persons who leave their jobs due to various reasons]. Medycyna pracy, 54 (6)555-562.
Szubert, Z. & Sobala, W. 2003a. [Health reasons for work disability among persons before going into early retirement]. Medycyna pracy, 55 (3)249-255.
Szubert, Z. & Sobala, W. 2003b. Sickness absence in persons who leave their jobs due to various reasons]. Medycyna pracy, 54 (6)555.
Szubert, Z. & Sobala, W. 2004a. [Health reasons for work disability among municipal transport drivers]. Medycyna pracy, 56 (4)285-293.
Szubert, Z. & Sobala, W. 2004b. Health reasons for work disability among persons before going into early retirement]. Medycyna pracy, 55 (3)249.
Szubert, Z. & Sobala, W. 2005a. Current determinants of early retirement among blue collar workers in Poland. International journal of occupational medicine and environmental health, 18 (2)177-184.
Szubert, Z. & Sobala, W. 2005b. Health reasons for work disability among municipal transport drivers]. Medycyna pracy, 56 (4)285.
Szubert, Z. & Sobala, W. 2005c. [Some job factors associated with departure from working life before retirement age]. Medycyna pracy, 57 (4)325-334.
Szubert, Z., Sobala, W. & Zycińska, Z. 1996. [The effect of system restructuring on absenteeism due to sickness in the work place. I. Sickness absenteeism during the period 19989-1994]. Medycyna Pracy, 48 (5)543-551.
Taimela, S., Lr, E., Malmivaara, A., Tiekso, J., Sintonen, H., Justn, S. & Aro, T. 2007. Self-reported health problems and sickness absence in different age groups predominantly engaged in physical work. Occupational and environmental medicine, 64 (11)739-746.
Talaga, J. & Beehr, T. A. 1989. Retirement: A psychological perspective.
Talaga, J. A. & Beehr, T. A. 1995. Are there gender differences in predicting retirement decisions? Journal of Applied Psychology, 80 (1)16.
Taloyan, M., Aronsson, G., Leineweber, C., Hanson, L. M., Alexanderson, K. & Westerlund, H. 2012. Sickness presenteeism predicts suboptimal self-rated health and sickness absence: a nationally representative study of the Swedish working population.
Tang, T. L.-P. & Hammontree, M. L. 1992. The effects of hardiness, police stress, and life stress on police officers' illness and absenteeism. Public Personnel Management, 21 493-493.
Tanner, S. 1998. The dynamics of male retirement behaviour. Fiscal Studies, 19 (2)175-196.
Taylor, M. A. & Shore, L. M. 1995. Predictors of planned retirement age: An application of Beehr's model. Psychology and aging, 10 (1)76.
Taylor, P. & Burridge, J. 1982. Trends in death, disablement, and sickness absence in the British Post Office since 1981. British journal of industrial medicine, 39 (1)1-10.

Taylor, P., Pocock, S. & Sergean, R. 1972. Absenteeism of shift and day workers: a study of six types of shift system in 29 organizations. British journal of industrial medicine, 29 (2)208-213.
Taylor, P. J. 1967. Shift and day work: A comparison of sickness absence, lateness, and other absence behaviour at an oil refinery from 1962 to 1965. British journal of industrial medicine, 24 (2)93-102.
Taylor, P. J. 1976. Occupational and regional associations of death, disablement, and sickness absence among Post Office staff 1972-75. British journal of industrial medicine, 33 (4)230-235.
Tenhiälä, A., Linna, A., von Bonsdorff, M., Pentti, J., Vahtera, J., Kivimäki, M. & Elovainio, M. 2013. Organizational justice, sickness absence and employee age. Journal of Managerial Psychology, 28 (7/8)805-825.
The European Working Condition Survey 2010. Format of the European Working Conditions Survey. [online] Available from: . http://www.eurofound.europa.eu/sites/default/files/ef_files/surveys/ewcs/2010/documents/masterquestionnaire.pdf [Accessed on 10/02/2014].
Theorell, T. 1996. The demand-control-support model for studying health in relation to the work environment: an interactive model. Behavioral medicine approaches to cardiovascular disease prevention, 69-85.
Theorell, T. & Karasek, R. A. 1996. Current issues relating to psychosocial job strain and cardiovascular disease research. Journal of occupational health psychology, 1 (1)9.
Theorell, T., Perski, A., Åkerstedt, T., Sigala, F., Ahlberg-Hultén, G., Svensson, J. & Eneroth, P. 1988. Changes in job strain in relation to changes in physiological state: a longitudinal study. Scandinavian journal of work, environment & health, 189-196.
Thomson, L., Griffiths, A. & Davison, S. 2000. Employee absence, age and tenure: a study of nonlinear effects and trivariate models. Work & Stress, 14 (1)16-34.
Topa, G., Moriano, J. A., Depolo, M., Alcover, C.-M. & Morales, J. F. 2009. Antecedents and consequences of retirement planning and decision-making: A meta-analysis and model. Journal of Vocational Behavior, 75 (1)38-55.
Trinkoff, A. M., Storr, C. L. & Lipscomb, J. A. 2001. Physically demanding work and inadequate sleep, pain medication use, and absenteeism in registered nurses. Journal of occupational and environmental medicine, 43 (4)355-363.
Trybou, J., Germonpre, S., Janssens, H., Casini, A., Braeckman, L., Bacquer, D. D. & Clays, E. 2014. Job‐Related Stress and Sickness Absence Among Belgian Nurses: A Prospective Study. Journal of nursing scholarship, 46 (4)292-301.
Tsai, S. P., Gilstrap, E. L., Colangelo, T. A., Menard, A. K. & Ross, C. E. 1997. Illness absence at an oil refinery and petrochemical plant. Journal of occupational and environmental medicine, 39 (5)455-462.
Tsai, S. P., Wendt, J. K., Ahmed, F. S., Donnelly, R. P. & Strawmyer, T. R. 2005. Illness absence patterns among employees in a petrochemical facility: impact of selected health risk factors. Journal of occupational and environmental medicine, 47 (8)838-846.
Tsutsumi, A. & Kawakami, N. 2004. A review of empirical studies on the model of effort–reward imbalance at work: reducing occupational stress by implementing a new theory. Social Science & Medicine, 59 (11)2335-2359.
Tüchsen, F., Christensen, K. B. & Lund, T. 2008A. Shift work and sickness absence. Occupational medicine, 58 (4)302-304.
Tüchsen, F., Christensen, K. B., Lund, T. & Feveile, H. 2008B. A 15-year prospective study of shift work and disability pension. Occupational and environmental medicine, 65 (4)283-285.

Tüchsen, F., Christensen, K. B., Nabe-Nielsen, K. & Lund, T. A. 2008C. Does evening work predict sickness absence among female carers of the elderly? Scandinavian journal of work, environment & health, 34 (6)483-486.

Tüchsen, F., Hannerz, H. & Burr, H. 2006. A 12 year prospective study of circulatory disease among Danish shift workers. Occupational and environmental medicine, 63 (7)451-455.

Tunceli, K., Bradley, C. J., Nerenz, D., Williams, L. K., Pladevall, M. & Lafata, J. E. 2005. The impact of diabetes on employment and work productivity. Diabetes Care, 28 (11)2662-2667.

Tuomi, K., Eskelinen, L., Toikkanen, J., Jarvinen, E., Ilmarinen, J. & Klockars, M. 1991. Work load and individual factors affecting work ability among aging municipal employees. Scandinavian journal of work, environment & health, 128-134.

Tuomi, K., Huuhtanen, P., Nykyri, E. & Ilmarinen, J. 2001. Promotion of work ability, the quality of work and retirement. Occupational Medicine, 51 (5)318-324.

UK Health and Safety Executive 1997A 'Successful Health and Safety Management' [online] Available from: . www.sh168.org.tw/getRef.ashx?id=17 [Accessed on 20/05/2015].

UK Health and Safety Executive 2011. 'Striking the balance between operational and health and safety duties in the Police' [online] Available from: http://www.hse.gov.uk/services/police/assets/docs/explanatory-note.pdf [Accessed on 10/05/2015].

UK Health and Safety Executive 2015. 'Police services-statistics' [online] Available from: . http://www.hse.gov.uk/services/police/statistics.htm [Accessed on 10/05/2015].

UK Health and Safety Executive 1997B. Successful management of health and safety management system. [Online] Avaliable from:. http://www.enviro-safe.co.uk/images/documents/hsg65.pdf [Accessed on 10/02/2014].

Ulleberg, P. & Rundmo, T. s. 1997. Job stress, social support, job satisfaction and absenteeism among offshore oil personnel. Work & Stress, 11 (3)215-228.

Undén, A.-L. 1996. Social support at work and its relationship to absenteeism. Work & Stress, 10 (1)46-61.

United Nations 2015. Population Division statistics [online] Available from http://esa.un.org/unpd/wpp/DVD/ [Accessed on 20/05/2015].

Upmark, M., Hemmingsson, T., Romelsjo, A., Lundberg, I. & Allebeck, P. 1997. Predictors of disability pension among young men The role of alcohol and psychosocial factors. The European Journal of Public Health, 7 (1)20-28.

Upmark, M., Möller, J. & Romelsjö, A. 1999. Longitudinal, population-based study of self reported alcohol habits, high levels of sickness absence, and disability pensions. Journal of epidemiology and community health, 53 (4)223-229.

USA Quality of Employment Surveys 2007. "JCQ Questionnair Packet Instructions" [online] Available from: http://unhealthywork.org/wpcontent/uploads/2012_Practice_Questionnaire_Directions_and_Scoring.pdf [Accessed on 10/01/2015].

Väänänen, A., Kumpulainen, R., Kevin, M. V., Ala-Mursula, L., Kouvonen, A., Kivimäki, M., Toivanen, M., Linna, A. & Vahtera, J. 2008. Work-family characteristics as determinants of sickness absence: a large-scale cohort study of three occupational grades. Journal of occupational health psychology, 13 (2)181.

Väänänen, A., Toppinen-Tanner, S., Kalimo, R., Mutanen, P., Vahtera, J. & Peiró, J. M. 2003. Job characteristics, physical and psychological symptoms, and social support as antecedents of sickness absence among men and women in the private industrial sector. Social Science & Medicine, 57 (5)807-824.

Vaez, M., Rylander, G., Nygren, Å., Åsberg, M. & Alexanderson, K. 2007. Sickness absence and disability pension in a cohort of employees initially on long-term sick leave due to psychiatric disorders in Sweden. Social psychiatry and psychiatric epidemiology, 42 (5)381-388.

Vahtera, J., Kivimäki, M., Koskenvuo, M. & Pentti, J. 1997A. Hostility and registered sickness absences: a prospective study of municipal employees. Psychol Med, 27 (3)693-701.

Vahtera, J., Kivimaki, M. & Pentti, J. 1997B. Effect of organisational downsizing on health of employees. The Lancet, 350 (9085)1124-1128.

Vahtera, J., Kivimäki, M. & Pentti, J. 2001. The role of extended weekends in sickness absenteeism. Occupational and environmental medicine, 58 (12)818-822.

Vahtera, J., Kivimäki, M., Pentti, J., Linna, A., Virtanen, M., Virtanen, P. & Ferrie, J. E. 2004A. Organisational downsizing, sickness absence, and mortality: 10-town prospective cohort study. Bmj, 328 (7439)555.

Vahtera, J., Kivimäki, M., Pentti, J. & Theorell, T. 2000. Effect of change in the psychosocial work environment on sickness absence: a seven year follow up of initially healthy employees. Journal of Epidemiology and Community Health, 54 (7)484-493.

Vahtera, J., Laine, S., Virtanen, M., Oksanen, T., Koskinen, A., Pentti, J. & Kivimaki, M. 2010. Employee control over working times and risk of cause-specific disability pension: the Finnish Public Sector Study. Occupational and environmental medicine, 67 (7)479-485.

Vahtera, J., Pentti, J., Helenius, H. & Kivimaki, M. 2006. Sleep disturbances as a predictor of long-term increase in sickness absence among employees after family death or illness. Sleep-New York 29 (5)673.

Vahtera, J., Pentti, J. & Kivimäki, M. 2004B. Sickness absence as a predictor of mortality among male and female employees. Journal of Epidemiology and Community Health, 58 (4)321-326.

Vahtera, J., Pentti, J. & Uutela, A. 1996. The effect of objective job demands on registered sickness absence spells; do personal, social and job-related resources act as moderators? Work & Stress, 10 (4)286-308.

Vahtera, J., Poikolainen, K., Kivimäki, M., Ala-Mursula, L. & Pentti, J. 2002. Alcohol intake and sickness absence: a curvilinear relation. American Journal of Epidemiology, 156 (10)969-976.

Vahtera, J., Virtanen, P., Kivimäki, M. & Pentti, J. 1999. Workplace as an origin of health inequalities. Journal of Epidemiology and Community Health, 53 (7)399-407.

Van Amelsvoort, L., Kant, I., Beurskens, A., Schröer, C. & Swaen, G. 2002. Fatigue as a predictor of work disability. Occupational and environmental medicine, 59 (10)712-713.

Van Amelsvoort, L. G., Spigt, M. G., Swaen, G. M. & Kant, I. 2006. Leisure time physical activity and sickness absenteeism; a prospective study. Occupational medicine, 56 (3)210-212.

van den Berg, T., Schuring, M., Avendano, M., Mackenbach, J. & Burdorf, A. 2010A. The impact of ill health on exit from paid employment in Europe among older workers. Occupational and environmental medicine, 67 (12)845-852.

van den Berg, T. I., Elders, L. A. & Burdorf, A. 2010B. Influence of health and work on early retirement. Journal of Occupational and Environmental Medicine, 52 (6)576-583.

Van den Heuvel, S., Boshuizen, H., Hildebrandt, V., Blatter, B., Ariëns, G. & Bongers, P. 2005. Effect of sporting activity on absenteeism in a working population. British journal of sports medicine, 39 (3)e15-e15.

Van der Doef, M. & Maes, S. 1999. The job demand-control (-support) model and psychological well-being: a review of 20 years of empirical research. Work & stress, 13 (2)87-114.
van der Giezen, A. M., Bouter, L. M. & Nijhuis, F. J. 2000. Prediction of return-to-work of low back pain patients sicklisted for 3–4 months. Pain, 87 (3)285-294.
Van der Hulst, M. 2003. Long workhours and health. Scandinavian journal of work, environment & health.
Van Duijvenbode, D., Hoozemans, M., Van Poppel, M. & Proper, K. 2009. The relationship between overweight and obesity, and sick leave: a systematic review. International Journal of Obesity, 33 (8)807-816.
van Oostrom, S. H., van Mechelen, W., Terluin, B., de Vet, H. C., Knol, D. L. & Anema, J. R. 2010. A workplace intervention for sick-listed employees with distress: results of a randomised controlled trial. Occupational and environmental medicine, 67 (9)596-602.
van Poppel, M. N., Chinapaw, M. J., Mokkink, L. B., Van Mechelen, W. & Terwee, C. B. 2010. Physical Activity Questionnaires for Adults. Sports Medicine, 40 (7)565-600.
van Rhenen, W., Blonk, R. W., Schaufeli, W. B. & van Dijk, F. J. 2007. Can sickness absence be reduced by stress reduction programs: on the effectiveness of two approaches. International archives of occupational and environmental health, 80 (6)505-515.
VandenHeuvel, A. & Wooden, M. 1995. Do explanations of absenteeism differ for men and women? Human Relations, 48 (11)1309-1329.
Vasse, R., Nijhuis, F. & Kok, G. 1998. Associations between work stress, alcohol consumption and sickness absence. Addiction, 93 (2)231-241.
Vijan, S., Hayward, R. A. & Langa, K. M. 2004. The impact of diabetes on workforce participation: results from a national household sample. Health Services Research, 39 (6p1)1653-1670.
Vingård, E., Alexanderson, K. & Norlund, A. 2004. . Consequences of being on sick leave. Scandinavian journal of public health, 32 (63 suppl)207-215.
Vingård, E., Lindberg, P., Josephson, M., Voss, M., Heijbel, B., Alfredsson, L., Stark, S. & Nygren, Å. 2005. Long-term sick-listing among women in the public sector and its associations with age, social situation, lifestyle, and work factors: a three-year follow-up study. Scandinavian journal of public health, 33 (5)370-375.
Violanti, J. M. 1997. Suicide and the police role: A psychosocial model. Policing: An International Journal of Police Strategies & Management, 20 (4)698-715.
Virtanen, M., Kivimäki, M., Vahtera, J., Elovainio, M., Sund, R., Virtanen, P. & Ferrie, J. 2006. Sickness absence as a risk factor for job termination, unemployment, and disability pension among temporary and permanent employees. Occupational and Environmental Medicine, 63 (3)212-217.
Virtanen, M., Vahtera, J., Pentti, J., Honkonen, T., Elovainio, M. & Kivimäki, M. 2007. Job strain and psychologic distress: influence on sickness absence among Finnish employees. American journal of preventive medicine, 33 (3)182-187.
Virtanen, P., Nakari, R., Ahonen, H., Vahtera, J. & Pentti, J. 2000. Locality and habitus: the origins of sickness absence practices. Social Science & Medicine, 50 (1)27-39.
Viscusi, W. K. & Hersch, J. 2001. Cigarette smokers as job risk takers. Review of Economics and Statistics, 83 (2)269-280.
Visscher, T. L., Rissanen, A., Seidell, J. C., Heliovaara, M., Knekt, P., Reunanen, A. & Aromaa, A. 2004. Obesity and unhealthy life-years in adult Finns: an empirical approach. Archives of Internal Medicine, 164 (13)1413.

Vistnes, J. P. 1997. Gender differences in days lost from work due to illness. Industrial and Labor Relations Review, 304-323.

Viswesvaran, C. 2002. Absenteeism and Measures of Job Performance: A Meta‐Analysis. International Journal of Selection and Assessment, 10 (1‐2)12-17.

Vitaliano, P. P., Zhang, J. & Scanlan, J. M. 2003. Is caregiving hazardous to one's physical health? A meta-analysis. Psychological bulletin, 129 (6)946.

Von Bonsdorff, M. E., Huuhtanen, P., Tuomi, K. & Seitsamo, J. 2009. Predictors of employees' early retirement intentions: an 11-year longitudinal study. Occupational Medicine, kqp126.

Von Bonsdorff, M. E., Huuhtanen, P., Tuomi, K. & Seitsamo, J. 2010A. Predictors of employees' early retirement intentions: an 11-year longitudinal study. Occupational Medicine, 60 (2)94-100.

von Bonsdorff, M. E., Vanhala, S., Seitsamo, J., Janhonen, M. & Husman, P. 2010B. Employee well-being, early-retirement intentions, and company performance. Journal of Occupational and Environmental Medicine, 52 (12)1255-1261.

Voss, M., Floderus, B. & Diderichsen, F. 2001. Physical, psychosocial, and organisational factors relative to sickness absence: a study based on Sweden Post. Occupational and environmental medicine, 58 (3)178-184.

Voss, M., Stark, S., Alfredsson, L., Vingård, E. & Josephson, M. 2008. Comparisons of self-reported and register data on sickness absence among public employees in Sweden. Occupational and Environmental Medicine, 65 (1)61-67.

Vuosalmi, M., Lintonen, T. & Jylha, M. 2006. Comparative vs global self-rated health: associations with age and functional ability. Aging clinical and experimental research, 18 (3)211-217.

Wahrendorf, M., Dragano, N. & Siegrist, J. 2012. Social Position, Work Stress, and Retirement Intentions: A Study with Older Employees from 11 European Countries. European Sociological Review.

Wallman, T., Burel, G., Kullman, S. & Svärdsudd, K. 2004. Health care utilisation before and after retirement due to illness. A 13-year population-based follow-up study of prematurely retired men and referents from the general population. Scandinavian journal of primary health care, 22 (2)95-100.

Wallman, T., Wedel, H., Palmer, E., Rosengren, A., Johansson, S., Eriksson, H. & Svärdsudd, K. 2009. Sick-leave track record and other potential predictors of a disability pension. A population based study of 8,218 men and women followed for 16 years. BMC Public Health, 9 (1)104.

Wang, M.-J., Mykletun, A., Møyner, E. I., Øverland, S., Henderson, M., Stansfeld, S., Hotopf, M. & Harvey, S. B. 2014. Job strain, health and sickness absence: results from the Hordaland Health Study. PloS one, 9 (4)e96025.

Wang, M. & Shultz, K. S. 2010. Employee retirement: A review and recommendations for future investigation. Journal of Management, 36 (1)172-206.

WATERS, J. A. & USSERY, W. 2009. Police stress, history, contributing factors, symptoms and interventions. .

Wedegaertner, F., Arnhold-Kerri, S., Sittaro, N. A., Hillemacher, T., Bleich, S., Geyer, S. & te Wildt, B. 2011. P01-125 - Alcohol-related absence from work and hospital treatment are associated with higher mortality and permanent disability among workers. European Psychiatry, 26, Supplement 1 (0)125.

Weil, Y., Weil, D., Donchin, M., Mann, G. & Hasharoni, A. 2004. Correlation between pre-employment screening X-ray finding of spondylolysis and sickness absenteeism due to low back pain among policemen of the Israeli police force. Spine, 29 (19)2168-2172.

Westerlund, H., Alexanderson, K., Åkerstedt, T., Hanson, L. M., Theorell, T. & Kivimäki, M. 2008. Work-related sleep disturbances and sickness absence in the Swedish working population, 1993–1999. Sleep, 31 (8)1169.

Whitaker, S. C. 2001. The management of sickness absence. Occupational and environmental medicine, 58 (6)420-424.

Willgerodt, M. A., Kataoka-Yahiro, M., Kim, E. & Ceria, C. 2005. Issues of instrument translation in research on Asian immigrant populations. Journal of Professional Nursing, 21 (4)231-239.

Willis, G. B. 2004. Cognitive interviewing: A tool for improving questionnaire design. Sage Publications.

Wister, A. V. 1996. The Effects of Socioeconomic Status on Exercise and Smoking Age-Related Differences. Journal of Aging and Health, 8 (4)467-488.

Wohlgemuth, E. & Betz, N. E. 1991. Gender as a moderator of the relationships of stress and social support to physical health in college students. Journal of counseling psychology, 38 (3)367.

World Bank 2013. Health inidcators. [Online] Available from: http://data.worldbank.org/indicator/SH.MED.BEDS.ZS [Accessed on 20/05/2015].

Xie, J. L. & Johns, G. 2000. Interactive effects of absence culture salience and group cohesiveness: A multi-level and cross-level analysis of work absenteeism in the Chinese context. Journal of Occupational and Organizational Psychology, 73 31.

Ybema, J. F., Evers, M. S. & van Scheppingen, A. R. 2011. A longitudinal study on the effects of health policy in organizations on job satisfaction, burnout, and sickness absence. Journal of occupational and environmental medicine, 53 (11)1251-1257.

Yuan, C., Wang, Z., Inslicht, S. S., McCaslin, S. E., Metzler, T. J., Henn-Haase, C., Apfel, B. A., Tong, H., Neylan, T. C. & Fang, Y. 2011. Protective factors for posttraumatic stress disorder symptoms in a prospective study of police officers. Psychiatry research, 188 (1)45-50.

Zins, M., Carle, F., Bugel, I., Leclerc, A., Orio, F. D. & Goldberg, M. 1999. Predictors of change in alcohol consumption among Frenchmen of the GAZEL study cohort. Addiction, 94 (3)385-395.

Appendix

Table A 1.1 General predictors of disability retirement

Variable group	Literature findings
Non-work factors	The risk of disability retirement increases in old employees (Alexanderson & Norlund, 2004; Karlsson et al., 2008), females (Lund & Villadsen, 2005; Nicolle et al., 2008), individuals in low SES (Leinonen et al., 2011; Krokstad et al., 2002 & 2004), heavy and more frequent alcohol drinkers (Upmark et al., 1997; Mansson et al., 1999; Ruidavets et al., 2010), overweight and obese individuals and individuals with low physical activity (Robroek et al., 2013A & 2013B). The risk also increases in those with poor self-rated health (Feldman, 1994; Taylor, 1995), medical conditions such as mental disorders and musculoskeletal diseases (Astrand and Isacsson, 1988; Karpansa et al., 2005; Pit et al., 2010), cancer (Lindholm et al., 2002; Krokstad & Westin, 2004) and cardiovascular diseases (Pit et al., 2010; Paradise et al., 2012; Herquelot et al., 2011).
Work factors	In general, job strain (Laine et al., 2009; Krause et al., 1997) and low control (Krokstad et al., 2002; Blekesaune & Solem, 2005) predicts disability retirement. The high risk of disability retirement in individuals with job strain or low job control may be explained by the various diseases associated with such psychologically unfavourable working conditions such as musculoskeletal diseases (Macfarlane et al., 2009; Linton, 2001) and mental diseases (Bonde; 2006; Stansfeld & Candy, 2006). The findings of studies investigating the influence of workplace support on the risk of disability retirement are inconsistent and inconclusive. (Albertsen et al., 2007; Sinokki et al., 2010; Krause et al., 1997). In general, the literature indicates that heavy work load, poor work ergonomics or working in an uncomfortable positions (Lund et al., 2001; Krause et al., 1997; Albertsen et al., 2007; Labriola et al., 2009), vibration (Christensen et al., 2008; Stover et al., 2013) and noise (Krause et al., 1997; Stover et al., 2013) are the most common physical work predictors of disability retirement. Studies investigating the influence of shift work on risk of disability retirement showed mixed results (Lahelma et al., 2012; Skogen et al., 2011; Tüchsen et al., 2008). The risk of disability retirement may also differ according to the type of job and employment sector. Manual workers in general have a higher risk of disability retirement than non-manual workers (Vahtera et al., 2009; Krokstad et al., 2002).

Table A 2.1 Summary of the 9 excluded studies by reasons for exclusion described in Box 2.1

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Reasons for exclusion 'a' study describes general absence and not sickness absence							
Ovuga and Madrama, 2006, Uganda	To evaluate the impact of alcohol related impairment on health problems in the Uganda Police.	Cross-sectional	104 police officers attending a semi-structured interview.	Survey	Alcohol dependence	Reported absence in the last 3 months and other psychosocial outcomes.	Officers who met the criteria for alcohol use problems had a statistically significant increase in risk of absences by three folds and half compared with those without (OR=3.58, 1.02-12.00).
Reasons for exclusion 'b' police sickness absence combined with other occupational groups							
Morren et al. 2007, Netherland	To examine the effect of a disaster on health using sickness absence data of rescue workers.	Case control study followed for 3 years and a half after the disaster	799 police officers (involved in disaster) and 1,298 from another area (control) (Total n=3,053)	Registered data.	City (affected by disaster yes/no)	Prevalence, incidence, frequency, sick days, average duration per spell and disease specific.	All five SA measures among the study workers increased substantially in the 18 months after the disaster.
Reasons for exclusion 'c' police sickness absence combined with other occupational							
Demerouti et al. 2004, Netherlands	To investigate the impact of rotating shifts on job absenteeism	Cross-sectional	3,122 military police.	Survey	Rotation shift	Sickness absence (last 12 months) and other job and health outcomes.	Employees who work day shifts had statistically higher sickness absence than those working rotation or fixed non-day shifts.

Table A 2.1 continued

Author (s) Year Country	Aim	Data examined	Results
Reasons for exclusion 'd' describes sickness rights, compensations and sickness absence policies			
Emerson, 1951, US	To discuss differences in sick leave policies and rights between US police forces and how this affects the rate of sickness absence.	Sickness absence policies in six American cities, Boston, Los Angeles, New York, Cleveland, St. Louis and Detroit	Cleveland, St. Louis and Detroit all have liberal policies that allow practically unlimited leave to police officers who are sick or injured. The time lost for the six cities whose policies were described is 2.33 per cent for all years from 1930 to 1949. The rate for the years since 1945 is 2.61 per cent. However, the three cities with the more liberal systems enjoyed lower time loss rates for all the years examined as well as for the period since 1945
Unknown (editorial section), 1953, UK	To reflect on findings from a sickness absence statistical report for the London Metropolitan Police	A report published by Bransby and Thomson in 1953 comparing sickness absence statistics pre-war (1936-1938) and those after the war (1949-1951)	Rate of sickness absence was 4.7% in 1951 compared with 2.66% in 1938. The number of sickness absence spells per man and average length of sick leave between 1949 and 1951 increased by more than 50% and 16% respectively over of that of the pre-war period. Respiratory illnesses were responsible for twice as many sickness absences as any other group of illnesses.
Gilbert et al. 2006, UK	To describe how occupational health practitioners in the Metropolitan police helped a 43 year old police Sergeant who was on sickness absence due to low back pain return back to work.	A description of the various roles if occupational health practitioners in the rehabilitation of the officers and how this approach helped the speeding up of the officer's return to work.	20 months after the surgery and 27 months after the injury, the officer's condition was stable, his work role was ideal and rewarding and he could expect to complete his 30 years' service in this role.

Table A 2.1 continued

Author (s) Year Country	Aim	Data examined	Results
Continue: reasons for exclusion 'd' describes sickness rights, compensations and sickness absence policies			
Körlin et al. 2009, Sweden	To conduct a systematic literature review of all studies on sickness absence among women and men in the police. This would help in the introduction of relevant preventive actions to reduce the high sick-leave rates among police women in Sweden	Systematic Search using Medline, Social Sciences Citation Index, and PsychInfo. 21 articles were included in the review	In most of the included studies, analyses of results were not conducted separately for women and men. Thus, study populations may have experienced gender differences in sickness absence that were overlooked.
Guthrie, 2010, Australia	To discuss the issue of sick leave and workers' compensation entitlements for police officers and evaluate whether there was a lack of uniformity in entitlements in Australia in relation to police sick leave and workers' compensation coverage.	Sickness absence reports and compensation policies in various Australian Police forces.	Highest average sick leave per annum was in Western Australia (10.3 days) and New South Wales (9.6). Work related sickness absence was reported by the Australian Federal Police only (4.85 days per annum) The public compilation and publication in annual reports by police agencies of data relating to sick leave and workers' compensation are not uniform and in some cases data are simply not accessible.
Summerfield, 2012, UK	To reflect on 30 years of working as a consultant occupational psychiatrist for the Metropolitan Police.	Data were examined and results were solely from the author's past experiences in the Metropolitan police services.	At the time Summerfield was in the police force, 4.8% of the personnel was not performing full operational duties, with the loss of the equivalent of 180 police officers monthly because of stress related absence.

Box A 2.1 Type of sickness absence measure used in studies (number of studies implementing each type of measure)

1. **Average sickness absence per year (9):** (Cascio &Valenzi, 1978; Goodman,1990; Steinhardt et al., 1991; Kirkcaldy et al., 1994; Lechner and de Vries, 1997; Gyi & Porter, 1998; Arnott & Emerson, 2001; De Loes & Jansson, 2002; Rajarantham et al., 2011).
2. **Total number of sickness absence days for six months (5):** (Tang & Hommontree, 1992; McGhee et al., 2000; Arokoski et al., 2002; Dirkzwager et al., 2004; Burk & Mikkelsen, 2005)
3. **Total number or percentage of sickness absence days for more than 6 months (7):** (Guest, 1982; Weil et al., 2004; Berg et al., 2006; Baraku et al., 2010; Svedberg and Alexanderson, 2012; Magnavita & Garbarino, 2013; Arnott & Emerson,2001)
4. **Total number of sickness absence spells (3):** (Guest, 1982; Baraku et al., 2010; Magnavita & Garbarino, 2013)
5. **Length of sickness absence spells (5):** (Guest, 1982; Baraku et al., 2010; Magnavita & Garbarino, 2013; Gjerland et al., 2015; Hunt et al., 2013)
6. **Monthly rate of sickness absence (3):** (Boyce et al., 1991; Boyce et al., 2006; Phillips et al., 1991)
7. **Medical cause of sickness absence (5):** (Gyi & Porter, 1998; Weil et al., 2004; De Loes & Jansson, 2002; Berg et al., 2006; Baraku et al., 2010)
8. **Other measures less commonly used** include sickness absence prevalence (Guest, 1982); mean hours of sickness absence (English et al., 1989), average days of hospitalization (Goodman, 1990), incidence density (Weil et al., 2004), sickness absence incidence (Ferrario et al., 2007; Fekedulegn et al., 2013A & 2013B), sickness absence incidence for short, medium and long term sickness absence (Ferrario et al., 2007), attitudes towards sickness absence (Lalic & Hromin, 2012)

Table A 2.2 Variables used to describe the police sample in the 32 relevant studies.

Variable (number of studies describing the variable)	Studies	Findings
Age (19 studies)	Cascio & Valenzi, 1978	Mean age minorities=28.3 and non-minorities=29.8
	Guest,1982	Mean age=33.6
	English et al. 1989	Mean age exposed=36.7 and non-exposed=37.9
	Boyce et al. 1991	Mean age=34.8
	Steinhardt et al. 1991	Age classified by physical activity; mean sedentary=31.3, occasional activity=30.59 and those active 3 times a week=29.32
	Tang & Hommontree, 1992	Mean age=32.37
	Kirkcaldy et al. 1994	Mean age=47.1 (sample of senior officers)
	Brown et al. 1995	Mean age of men=34, women=28.5, police women=29 and civilian women=37
	Gardner et al. 1998	Mean age=30.8
	Gyi & Porter, 1998	Mean age for traffic police=37.6, general duty officers=36.7 and motor police=33.2
	Berg et al. 2006	Mean age=38.9
	Boyce et al. 2006	Mean non-smoker males=34.8 and females=30.3 while mean for smoker males=38.7 and females=30.4
	Rajarantham et al. 2011	Mean age=38.5
	Lalic & Hromin, 2012	Mean age=45.5
	Svedberg & Alexanderson, 2012	Males females <30 years old 7% 10%, 30-39 years of age 23% 25% 40-45 years of age 44% 46% >56 years old 25% 17%
	Magnavita & Garbarino, 2013	Mean age= 35.3
	Fekedulegn et al. 2013A	Mean age = 44.6 (day shift), 42.0 (afternoon shift) and 40.0 (night shift)
	Fekedulegn et al. 2013B	Mean age= 41.4
	Hunt et al. 2013	Age group distribution for police and civilians employees.
	Gjerland et al. 2015	12% of police employees under 30 and 69% between 30 and 49.

Table A 2.2 continued

Variable (number of studies describing the variable)	Studies	Findings
Gender (18 studies)	Cascio & Valenzi,1978	96% males and 4% females.
	English et al. 1989	79% of exposed and 78.4 of non-exposed were males.
	Boyce et al. 1991	84% males and 16% females.
	Steinhardt et al. 1991	89% males and 11% females.
	Kirkcaldy et al. 1994	97% males and 3% females
	Brown et al. 1995	20.5% males and 79.5% females. (A higher percentage of females was required to examine the research questions.
	Gardner et al. 1998	66.6% males and 33.3% females.
	McGhee et al. 2000	86% males and 14% females.
	Burk & Mikkelsen, 2005	78% males and 22% females.
	Berg et al. 2006	84% males and 16% females.
	Boyce et al. 2006	84% males and 16% females.
	Rajarantham et al. 2011	82% males and 18% females.
	Lalic & Hromin, 2012	45% males and 55% females. (Design requiring non-manual clerical police staff)
	Svedberg & Alexanderson, 2012	62% males and 38% females.
	Fekedulegn et al. 2013A	Males represented 64.9%, 86% and 79% of day shift, afternoon shift and night shift employees.
	Fekedulegn et al. 2013B	73% males and 27% females.
	Hunt et al. 2013	68% of police officers and 29% of civilians were males
	Gjerland et al. 2015	68% males and 32% females.

Table A 2.2 continued

Variable (number of studies describing the variable)	Studies	Findings
Tenure (10 studies)	Cascio & Valenzi,1978	Mean non-minority=3.7 and minority=3
	Tang & Hommontree, 1992	Mean=7.63
	Kirkcaldy et al. 1994	Mean=26.7 (sample of senior officers)
	Brown et al. 1995	Mean for Men=12, women=7, civilian women=7.5 and women officers=8
	Burk & Mikkelsen, 2005	48% <10 years tenure, 37% 11-20 years tenure and 19% >21 years tenure.
	Svedberg & Alexanderson, 2012	20% <5 years tenure, 8% 5-9 years tenure, 32% 10-25 years tenure and 41% >26 years tenure.
	Magnavita & Garbarino, 2013	Mean=14
	Fekedulegn et al. 2013A	Mean= 17.3 (day shift), 16.7 (afternoon shift) and 12.8 (night shift)
	Fekedulegn et al. 2013B	Mean= 14.8
	Hunt et al. 2013	40% and 56% of police officers and civilians respectively had 0 to 9 years of services.
Rank (10 studies)	Boyce et al. 1991	82% patrol officers and 18% Sergeant
	Kirkcaldy et al. 1994	55% uniform operational command, 21% HR, 8% non-uniform operational command and 17% other jobs
	Weil et al. 2004	84% Junior officers and 16% senior officers.
	Berg et al. 2006	65% non-management, 31% middle management and 3% upper management
	Boyce et al. 2006	81% patrol officers and 19% Sergeant and above.
	Rajarantham et al. 2011	66% police officers, 8% detectives and 15% superintendents.
	Magnavita & Garbarino, 2013	48% supervisors/technical staff.
	Fekedulegn et al. 2013A	65% Patrol officers, 13% Sergeant/Lieutenant and remaining Captain/Detective
	Fekedulegn et al. 2013B	71% Patrol officers, 14% Sergeant/Lieutenant and remaining Captain/Detective
	Hunt et al. 2013	74% Junior police ranks

Table A 2.2 continued

Variable (number of studies describing the variable)	Studies	Findings
Race (8 studies)	Cascio & Valenzi,1978	83% White, 6% Black and 11% other minority groups.
	Boyce et al. 1991	78% White and 22% Black
	Steinhardt et al. 1991	75% White, 14% Hispanics and Black 11%.
	Gardner et al. 1998	66% White and 34% Black.
	Boyce et al. 2006	77% White and 23% Black.
	Rajarantham et al. 2011	85% White, 8% Black and 7% other minority groups.
	Fekedulegn et al. 2013A	77% White, 20% Black and 3% Hispanic.
	Fekedulegn et al. 2013A	76.6% White, 21.6% Black and 1.8% Hispanic.
Education (8 studies)	Tang & Hommontree, 1992	Mean years=13.24
	Kirkcaldy et al. 1994	30% hold university degrees, 11% diplomas, 14% GCE A level and 44% with GCE up to O level.
	Gardner et al. 1998	Mean years=13.7
	Weil et al. 2004	79% between 8-12 years of education and 21% more than 12 years of education
	Burk & Mikkelsen, 2005	9% <13 years of education, 63% between 14-16 years of education and 28% more than 17 years of education
	Magnavita & Garbarino, 2013	75% hold a diploma or a degree.
	Fekedulegn et al. 2013A	33% had four years or more of college education
	Fekedulegn et al. 2013B	33% had four years or more of college education

Table A 2.2 continued

Variable (number of studies describing the variable)	Studies	Findings
Marital status (8 studies)	Brown et al. 1995	% married males=70%, females=48%, civilian women=56% and women officers=48%
	Weil et al. 2004	68% married, 22% single and 10% divorced/widowed.
	Burk & Mikkelsen, 2005	78% married and 22% single.
	Berg et al. 2006	85% married, 11% single and 5% divorced/widowed.
	Magnavita & Garbarino, 2013	37% married.
	Fekedulegn et al. 2013A	75% married, 12% single and 13% divorced/widowed.
	Fekedulegn et al. 2013B	73% married, 12.9% single and 14% divorced/widowed.
	Hunt et al. 2013	70% in a relationship.
Presence of children (5)	Kirkcaldy et al. 1994	93% of the sample have children
	Brown et al. 1995	% with children, men=70% and women=21%
	Weil et al. 2004	Number of children for the sample range= 1.2 +/- 2.1
	Fekedulegn et al. 2013A	Number of children for each shift work type
	Fekedulegn et al. 2013B	Number of children for males and females.
Smoking status (4)	Kirkcaldy et al. 1994	42% smokers, 40% ex-smokers and 18% regular smokers.
	Boyce et al. 2006	79% non-smokers and 21% smokers.
	Fekedulegn et al. 2013A	59% non-smokers, 16% current smokers and 25% ex-smokers.
	Fekedulegn et al. 2013B	60.6% non-smokers, 16.6% current smokers and 22.8% ex-smokers.

Table A 2.2 continued

Variable (number of studies describing the variable)	Studies	Findings
Work location (3)	Burk & Mikkelsen, 2005	73% in urban areas and 27% in rural areas.
	Berg et al. 2006	73% in urban areas and 27% in rural areas.
	Gjerland et al. 2015	Site of work; 37% of police sample were working on the terror site.
Alcohol consumption (3)	Kirkcaldy et al. 1994	26% reported drinking seldom or not at all and 10% drank in excess of 22 units per week with 54% drinking between one and 21 units per week.
	Fekedulegn et al. 2013A	Number of alcohol drinks per week for each shift work type
	Fekedulegn et al. 2013B	Number of alcohol drinks per week for males and females.
BMI (3)	Rajarantham et al. 2011	Mean BMI=28.7
	Fekedulegn et al. 2013A	BMI index for each shift work type
	Fekedulegn et al. 2013B	BMI index for males and females.
Sleep quality (2)	Fekedulegn et al. 2013A	Average number of hours of sleep and quality of sleep for each work shift type.
	Fekedulegn et al. 2013B	Average number of hours of sleep and quality of sleep for males and females.
Physical activity (2)	Fekedulegn et al. 2013A	Hours of physical activity per week for each work shift type.
	Fekedulegn et al. 2013B	Hours of physical activity per week for males and females.
Hours worked (2)	Burk & Mikkelsen, 2005	12% worked <35 hours/week, 85% between 36 and 39 hours/week and 3% >40 hours/week.
	Fekedulegn et al. 2013B	Total working hours per week and overtime work for males and females.
Health status	Rajarantham et al. 2011	36% and 42% reported their health to be either ‘good’ or ‘very good’.
Overtime work	Burk & Mikkelsen, 2005	73% worked for 0-5 hours overtime a week and 27% for >6 hours a week
Shift work	Burk & Mikkelsen, 2005	54% worked in shifts around the clock, 36% worked shifts sometimes and 10% regular shift workers.

Table A 2.2 continued

Variable (number of studies describing the variable)	Studies	Findings
Religion	Weil et al. 2004	97% of the sample were Jewish officers.
Country of origin	Weil et al. 2004	16% from Asian or Africa, 65 from Europe or America and 78% from Israel.
Living in Barracks	Magnavita & Garbarino, 2013	56% of the sample live in Barracks.
Size of department	Burk & Mikkelsen, 2005	46% worked in department of 1-49 staff members, 15% in departments of 50-99 staff and 39% in departments with >100 staff.
Partner in police	Burk & Mikkelsen, 2005	Only 14% have partners working in the police.
Number of inhabitants served by the force	Berg et al. 2006	51% worked in forces with >50,000 inhabitants, 20% between 20,000 and 50,000 and 22% between 5,000 and 20,000.
Work mode	Fekedulegn et al. 2013A	64% of officers reported to have high work load.

Table A 2.3 Summary of relevant articles excluded according to reasons c and d in Box 2.2

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Reason for exclusion: Reason 'c' (see Figure 1) outcome not disability retirement							
Taylor, 1976, UK	To describe occupational and regional associations of death, disablement, and sickness absence (SA) among Post Office staff 1972-75	Cohort	Records of post office staff under the age of 60 years for the three years beginning in April 1972.	Registered data.	Age, gender, job type, sickness absence and county	Medical wastage= Medical retirement + deaths	Statistically significant association between sickness absence and medical wastage by occupation and geographical region.
Dorning et al. 1996, Germany *(article in German)*	To investigate the effect of various socio-demographic characteristics and illness-related events on early retirement.	Cohort	Sickness fund beneficiaries of the (n = 31136)	Registered data.	Socio-demographic factors, sickness absence duration and benefits.	Early retirement application	The total numbers of sick-leave days had the greatest impact on application for early retirement. Besides this predictor comprising all diseases, various sick-leave and inpatient treatment events relating to specific groups of illnesses also proved to be relevant risk factors
Szubert et al. 1998, Poland *(article in Polish)*	To assess how far the risk of sick absenteeism increases among workers under termination of employment	Cohort	8,588 Polish industrial plant employees between 1989 and 1994	Registered data.	Age, sex, department, sickness absence spells and diagnosis.	Termination of employment.	The highest risk of work disability in persons leaving their jobs because of long-lasting illness. Risk of sickness absence was over 50% higher among retiring workers than among current workers (RR = 1.50 for men and 1.53 for women)

Table A 2.3 continued

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Continue: reasons for exclusion 'c' outcome not disability retirement							
Salonen et al. 2003, Finland	To find how health status, work ability and job-related factors were associated with premature departure from working life.	Cohort	126 ageing food industry employees (currently employed or who used to work in 1989)	Medical examination and survey	Subjective and objective health measures including sickness absence and work factors.	Status (such as actively employed, early pensioner and deceased)	Factors such as morbidity, sickness absence and degree of work impairment due to disease were significant factors associated with early exit from working life.
de Boer et al. 2004, Netherlands	To evaluate an occupational health intervention programme for workers at risk of early retirement.	RCT	116 employees of a large electronics manufacturing company (>50 years old)	Survey, registered and interview data	Demographic factors, job factors, work ability, quality of life and sickness absence.	Early retirement.	Fewer employees (11%) in the intervention group retired early than in the control group (28%). Average sickness absence days in two years was 82.3 for the intervention group and 107.8 for the control group.
Szubert et al. 2004, Poland *(article in Polish)*	To define the health status of persons going into early retirement on the basis of their sickness absence history.	Cohort study	Early retirees 1996-2000 (n=303) and employed individuals in the same age group (n=485)	Registered data.	Sex, sickness absence duration and diagnosis	Early retirement	The total SA among persons going into early retirement during the preceding five years was 64% for men (SA rate=18.56) and 14% for women (SA rate=15.97), and this was higher compared with those of still employed persons

Table A 2.3 continued

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Continue: reasons for exclusion 'c' outcome not disability retirement							
Szubert and Sobalal, 2005, Poland	To identify the factors that significantly contribute to early retirement	Matched case control	637 (265 persons who retired early and 372 currently working) from various industrial sectors.	Survey and registered data for sickness absence from previous work	Questionnaire: demographic factors, job characteristics, health condition and lifestyle. Registered sickness absence	Early retirement	Piece work system, increased heavy lifting at work, shortage of leisure time, presence of disability and increased rate of sickness absence and alcohol use were the main predictors of early retirement.
Carlsen et al. 2008, Netherland	To determine the risk for taking early retirement pension in cancer survivors	Case control for selection then cohort.	40,884 cancer patients and 196,109 cancer free controls	Registered data	Demographic factors, co morbidity, depression and sickness absence.	Early retirement pension (ERP)	Predictors of ERP are late age, manual job, SA last year, low education, low income and co morbidity.
Wedegaertner et al. 2011, Germany	To estimate effects of alcohol abuse on early retirement and premature death in the working population	Cohort.	125, 019 health insurance clients.	Registered data	Age, gender, education, job and alcohol related sickness absence.	Early retirement and premature death.	Both alcohol detoxification treatment and alcohol-related absenteeism from work (without inpatient treatment) significantly increased the risk of early retirement (RR=2.29 and 2.59 respectively).

Table A 2.3 continued

Author (s) Year Country	Aim	Type of study	Participants	Type of data	Main independent variables	Dependent variables	Results
Reason for exclusion: Reason 'd' retirement intention as an outcome							
Heponiemi et al, 2008, Finland	To investigate the influence of work and health factors on retirement intention	Cross-sectional	1,383 of Finish physicians	Survey data	Age, sex, self-rated heath, sickness absence, job control and organisational justice	Three level Retirement intention score	Reported poor health, low work ability and taking SA increase retirement intensions Significant increase in retirement intentions when sickness absence in the previous 12 months is present (OR=1.28, 95% CI= 1.12–1.46)

Table A 4.1 Total number of sickness absence spells of 1-3 days for cases and controls at end of the exposure period

Range (number of spells)	Cases		Controls		Total number
	N	*(%)*	*N*	*(%)*	
0	25	33.3	107	31.1	132
1-3	13	17.3	144	41.9	157
4-7	20	26.7	54	15.7	74
8-10	8	10.7	14	4.1	22
11+	9	12.0	25	7.3	34
Total	75	-	344	-	419

Table A 4.2 Total number of sickness absence spells of 4-7 days for cases and controls at end of the exposure period

Range (number of spells)	Cases		Controls		Total number
	N	*(%)*	*N*	*(%)*	
0	33	44	337	97.9	401
1-6	38	51	7	2.0	14
7+	4	5	0	0.0	4
Total	75	-	344	-	419

Table A 4.3 Total number of sickness absence spells of 8 days to four weeks for cases and controls at end of the exposure period

Range (number of spells)	Cases		Controls		Total number
	N	*(%)*	*N*	*(%)*	
0	26	34.7	280	81.4	306
1-3	33	44.0	59	17.1	92
4-6	11	14.7	1	0.3	12
7+	5	6.7	4	1.2	9
Total	75	-	344	-	419

Table A 4.4 Total number of sickness absence spells of more than four weeks for cases and controls at end of the exposure period.

Range (number of spells)	Cases		Controls		Total number
	N	*(%)*	*N*	*(%)*	
0	28	37.3	317	92.2	345
1-2	21	28.0	21	6.1	42
3-5	14	18.7	4	1.2	18
6+	12	16.0	2	0.6	14
Total	75	-	344	-	419

Table A 4.5 Total number of spells of sickness absence over the two year exposure period for cases and controls by age group.

Number of spells	Cases (n=75) Age group (N)					Controls (n=344) Age group (N)				
	18-29	30-39	40-49	50+	Total	18-29	30-39	40-49	50+	Total
0	0	1	4	2	7	19	22	15	5	61
1-3	4	6	3	2	15	46	50	44	21	161
4-7	4	4	2	1	11	27	29	10	3	69
8-10	1	2	2	4	9	2	10	6	1	19
11/19	8	7	2	0	17	12	7	6	5	30
20+	7	2	4	3	16	1	1	0	2	4
All spells	24	22	17	12	75	107	119	81	37	344

Table A 4.6 Total number of spells of sickness absence over the two year exposure period for cases and controls by sex

Number of spells	Cases (n=75)			Controls (n=344)		
	Females	Males	Total	Females	Males	Total
0	1	6	7	4	57	61
1-3	0	15	15	21	140	161
4-7	0	11	11	17	52	69
8-10	3	6	9	7	12	19
11/19	6	11	17	14	16	30
20+	6	10	16	3	1	4
All spells	16	59	75	66	278	344

Table A 4.7 Total number of days of sickness absence for spells lasting 1-3 days spells for cases and controls at the end of the exposure period

number of days of sickness absence	Cases		Controls		Total number
	N	*(%)*	*N*	*(%)*	
0	25	33.3	107	31.1	132
1-9	20	26.7	170	49.4	190
10-19	14	18.7	44	12.8	58
20-29	11	14.7	15	4.4	26
30+	5	6.7	8	2.3	13
Total	75	-	344	-	419

Table A 4.8 Total number of days of sickness absence for spells lasting 4-7 days for cases and controls at the end of the exposure period

number of days of sickness absence	Cases		Controls		Total number
	N	*(%)*	*N*	*(%)*	
0	33	44.0	262	76.2	295
1-9	20	26.67	65	18.9	85
10-19	12	16.0	9	2.6	21
20-29	6	8.0	5	1.5	11
30+	4	5.3	3	0.9	7
Total	75	-	344	-	419

Table A 4.9 Total number of days of sickness absence for spells lasting 8 days to four weeks for cases and controls at the end of the exposure period

number of days of sickness absence	Cases		Controls		Total number
	N	*(%)*	*N*	*(%)*	
0	26	34.7	280	81.4	306
1-9	2	2.7	6	1.7	8
10-19	17	22.7	25	7.3	42
20-29	6	8.0	15	4.4	21
30-39	3	4.0	7	2.0	10
40-69	7	9.3	7	2.0	14
70+	14	18.7	4	1.2	18
Total	5	-	344	-	419

Table A 4.10 Total number of days of sickness absence for spells lasting more than four weeks for cases and controls at the end of the exposure period

number of days of sickness absence	Cases		Controls		Total number
	N	*(%)*	*N*	*(%)*	
0	28	37.3	317	92.2	345
1-39	13	17.3	8	2.3	21
40-79	7	9.3	9	2.6	16
80-119	6	8.0	2	0.6	8
120-169	6	8.0	2	0.6	8
170+	15	19.7	6	1.8	21
Total	75	-	344	-	419

Table A 4.11 Frequency distribution of total number of days of sickness absence for cases and controls over the two year exposure period by age groups

Total number of days of sickness absence	Cases (n=75)					Controls (n=344)				
	Age group (N)					Age group (N)				
	18-29	30-39	40-49	50+	Total	18-29	30-39	40-49	50+	Total
0	0	1	4	2	7	19	22	15	7	63
1-39	2	12	4	1	19	81	90	53	23	247
40-79	3	2	1	3	9	4	3	6	5	18
80-119	4	0	3	0	7	1	0	3	0	4
120-169	3	2	0	1	6	0	1	0	0	1
160-199	3	2	1	1	7	0	0	1	0	1
200+	9	3	4	4	20	2	3	3	2	10
All durations	24	22	17	12	75	107	119	81	37	344

Table A 4.12 Frequency distribution of total number of days of sickness absence for cases and controls over the two year exposure period by sex

Total number of days of sickness absence	Cases (n=75)			Controls (n=344)		
	Females	Males	Total	Females	Males	Total
0	1	6	7	4	57	61
1-39	1	18	19	47	202	249
40-79	3	6	9	8	10	18
80-119	1	6	7	2	2	4
120-169	2	4	6	0	1	1
160-199	2	5	7	0	1	1
200+	6	14	20	5	5	10
All durations	16	59	75	66	278	344

Table A 5.1 Forward translation report

Question	Challenging phrases or words	Decision and reason
9.1	'Working very fast' translation as 'العمل السريع جدا' or 'العمل بسرعه كبيره'	Decision to use 'العمل بسرعه كبيره' as this phrase is more commonly used in the target population.
9.2	Translating 'working very hard' was difficult in Arabic as the direct translation is inappropriate and refers to a physically very tiring/exhausting job. One translator used 'بقوة' which means working strongly and the other used 'الجاد جدا' which means very serious	After discussion, it was decided that the we translate 'very hard' as جهد عالي even though the direct translation for this is 'working at a very high effort' and this will be revised after the backward translation.
9.4	Two close terms to describe demands in Arabic 'طلبات' which is direct translation and 'أوامر' which means orders at work.	Decision to use both terms and this will be revised after the backward translation.
6.2	Two different translations for 'creative' provided by the two translators, مبدعا which is the direct translation of creative and مبتكرا which means innovative.	It was decided to use the direct Arabic translation of 'creative' as innovative has a different meaning.
6.5	The question was translated differently by the two translators علي القيام بأمور عديدة في وظيفتي I have to do variety of matters/affairs in my job أحصل على مجموعه متنوعه من الأشياء في وظيفتي I get a variety things in my job	After a thorough discussion, it was decided to use this translation أقوم بمجموعة متنوعه من الأعمال في وظيفتي Direct English translation; I do variety of tasks in my job **Note**: The word 'things' has been replaced by 'tasks' in the Arabic translation as the direct translation of 'things' أشياء is not appropriate.

Continue Table A 5.1 Forward translation summary report

Question number	Challenging phrases or words	Decision and reason
6.7	Both translators have agreed on the translation of 'freedom'. However, there was a discussion about whether the word 'authority' is more appropriate for the target population	Decision to use the agreed direct translation of freedom and include 'authority' in brackets.
6.7	Discrepancies on translating 'how do I do my work', one translators used 'لأحدد كيفية إنجاز عملي/ How I complete/finish my job' and the other translator used ' لأقرر كيف أعمل To decide how I work?	It was decided to translated it as: في وظيفتي لدي الكثير من الحرية (الصلاحيه) في إختيار الطريقة المناسبه لأداء العمل
7.1-7.4	Both translators have agreed on the translation of 'People I work with', however, these direct Arabic translations could be seen as informal.	It was decided to use 'زملائي في العمل', directly translated in English as ' My colleagues at work'
7.1	'Competent' was translated as 'مؤهلين'; this is the direct translation from English to Arabic, the other translator used 'مختصين' which means specialized.	Decision to use 'مؤهل' as this is the appropriate term needed for this question.
7.3	'Friendly' can be described by two words in Arabic.	Decision to use both terms
7.4	Two close terms to describe helpful in Arabic which are متعاونين, متساعدين	Decision to use both terms
8.1-8.4	Supervisor can be described by two words in Arabic.	Decision to use both terms
8.2	'Pays attention' translated directly by one translator يظهر إهتماما whereas the other one translated it as يعير أهتمام which means pays/shows interest	Decision to use the direct translation and not يعير أهتمام which means pays/shows interest

Table A 5.2 Back translation summary report

Question number	Challenging phrases or words	Decision and reason
6.7	The use of 'authority' in brackets after 'freedom' seems to have confused translators	Remove 'authority' from the question and use the direct translation of freedom.
6.9	Discrepancy regarding appropriate translation of abilities Direct translation إمكانياتي Arguably more appropriate to use مهاراتي which indicate skills	The Arabic language expert recommended the use of قدراتي as it encompasses both skills and knowledge concepts.
9.4	Translators suggested that the direct translation of conflicting demand طلبات is more appropriate than أوامر	Only include the direct translation of order in the Arabic question.
7.3	Inclusion of both terms to describe 'friendly' is unnecessary	Decision to only include لطيفين as this best describes friendly.
7.4	The translators came up with three English translations for 'helpful'	It was decided to use only متساعدين as this is the most appropriate term.
8.1	The Arabic format of the translation is not clear as the English question considers how the supervisor is concerned about the 'welfare' of the employees rather than showing concern and looking after employees. Inclusion of the word welfare is needed.	Decision to re-format the Arabic translation and all agreed that the format should be مشرفي/ مسؤولي في العمل يهتم برعاية من هم تحت إمرته

Appendix A 5.3 Interview Scripts Document

Participant's ID:

Aim of interview explained:

Codes used:

Comprehension for terms and overall interpretation of questions (أ) فهم

Recall information/strategy (ب) التذكر

Confidence (ج) التأكد من الإجابة

Paraphrasing (part of comprehension) (د) إعادة الصياغة

Appendix A 5.3 continued

3.1	بشكل تقريبي، ماهو مجموع أيام إجازاتك المرضية خلال 12 شهرا الماضية؟	□ لايوجد 3-1 □ أيام 7- 4□ أيام 28-8 □ يوم 90-29 □ يوم 91 □ يوم أو أكثر

3.1	Approximately how many days in total have you been on sick leave during the past 12 months?	□ None □ 1–3 days □ 4–7 days □ 8–28 days □ 29–90 days □ 91 days or more

Probes:

ماهو تعريفك ل "مجموع أيام إجازاتك المرضية"؟ (أ)

كيف تتذكر مجموع أيام إجازاتك المرضية؟ (ب)

Results:

Suggested revision:

Appendix A 5.3 continued

3.3	Have you ever considered retiring before full retirement age?"	□ No, I have not □ Yes, often	□ Yes, sometimes □ I have already applied for retirement

3.3	هل فكرت مسبقا في الحصول على التقاعد المبكر قبل وصولك لسن التقاعد القانوني؟	□ لا لم يخطر لي □ نعم، أحيانا □ نعم، غالبا □ لقد تقدمت بطلب التقاعد مسبقا

Probes:

ممكن تعيد صياغة السؤال بطريقتك؟ (أ+د)

Results:

Suggested revision:

Appendix A 5.3 continued

9.1	My job requires working very fast	
	وظيفتي تتطلب العمل بسرعة كبيرة	9.1

Probes:

ماتعريفك ل "سرعة كبيرة"؟ (أ) أعطني أمثلة (ب)؟

Results:

Suggested revision:

Appendix A 5.3 continued

9.2	My job requires working very hard
وظيفتي تتطلب العمل بجهد عالي	9.2

Probes:

كيف وصلت لهذه الإجابة؟ (أ)

ماتعريفك ل "جهد عالي"؟ (أ)

Results:

Suggested revision:

Appendix A 5.3 continued

9.3	I have enough time to get the job done
لدي الوقت الكافي في وظيفتي لإتمام العمل	9.3

Probes:

ممكن تعيد السؤال بطريقتك الخاصة؟ (أ+د)

Results:

Suggested revision:

Appendix A 5.3 continued

9.4	I am free from conflicting demands others make
لاأعاني في وظيفتي من تضارب طلبات الأخرين	9.4

Probes:

كيف توصلت لهذه الإجابة؟ (أ)

ماتعريفك ل "تضارب طلبات الآخرين"؟ (أ)

Results:

Suggested revision:

Appendix A 5.3 continued

6.1	My job allows me to make a lot of decisions on my own

6.1	وظيفتي تتيح لي إتخاذ الكثير من القرارات بمفردي

Probes:

ماتعريفك ل "القرارات بمفردي"؟ (أ)

عطني أمثلة على ذلك؟ (ب)

Results:

Suggested revision:

Appendix A 5.3 continued

6.2	My job requires me to be creative
وظيفتي تتطلب مني أن أكون مبدعا	6.2

Probes:

كيف توصلت لهذه الإجابة؟ (أ)

Results:

Suggested revision:

Appendix A 5.3 continued

6.3	My job involves a lot of repetitive work
وظيفتي تحتوي على الكثير من العمل المتكرر	6.3

Probes:

عطني أمثلة على العمل المتكرر؟ (أ) وليس ب في هذا السؤال أو أ+ب

أعد صياغة السؤال بطريقتك؟ (أ+د)

Results:

Suggested revision:

Appendix A 5.3 continued

6.4	My job requires a high level of skill

وظيفتي تتطلب درجة عالية من المهارات	6.4

Probes:

أعد صياغة السؤال بطريقتك؟ (أ+د)

Results:

Suggested revision:

Appendix A 5.3 continued

6.5	I get to do a variety of things on my job
أقوم بمجموعة متنوعة من الأعمال في وظيفتي	6.5

Probes:

كيف توصلت لهذه الإجابة؟ (أ)

Results:

Suggested revision:

Appendix A 5.3 continued

6.6	My job requires that I learn new things
وظيفتي تتطلب أن أتعلم أشياء جديدة	6.6

Probes:

ماتعريفك ل "أشياءجديدة"؟ (أ) أعطني أمثلة (ب)؟

Results:

Suggested revision:

Appendix A 5.3 continued

6.7	On my job, I am given a lot of freedom to decide how I do my work
في وظيفتي لدي الكثير من الحرية في اختيار الطريقة المناسبه لأداء العمل	6.7

Probes:

أعد صياغة السؤال بطريقتك؟ (أ+د)

Results:

Suggested revision:

Appendix A 5.3 continued

7.1	People I work with are competent in doing their jobs
زملائي في العمل مؤهلين في أداء مهامهم	7.1

Probes:

ماتعريفك ل "مؤهلين"؟

Results:

Suggested revision:

Appendix A 5.3 continued

7.2	People I work with take a personal interest in me
زملائي في العمل يهتمون بي شخصيا	7.2

Probes:

كيف توصلت لهذه الإجابة؟ (أ)

Results:

Suggested revision:

Appendix A 5.3 continued

7.3	People I work with are friendly

7.3	زملائي في العمل لطفاء في التعامل معي

Probes:

أعد صياغة السؤال بطريقتك؟ (أ+د)

Results:

Suggested revision:

Appendix A 5.3 continued

7.4	People I work with are helpful in getting the job done
زملائي في العمل متساعدين متعاونون في إنجاز المهام المنوطة لهم	7.4

Probes:

أعد صياغة السؤال بطريقتك؟ (أ+د)

Results:

Suggested revision:

Appendix A 5.3 continued

8.1	My supervisor is concerned about the welfare of those under him
مشرفي/ مسؤولي في العمل يهتم برعاية من هم تحت إمرته (إشرافه)	8.1

Probes:

ماتعريفك ل "يهتم برعاية"؟ (أ) أعطني أمثلة (ب)؟

Results:

Suggested revision:

Appendix A 5.3 continued

8.2	My supervisor pays attention to what you are saying
مشرفي/ مسؤولي يعير إنتباه لما أقوله في العمل	8.2

Probes:

كيف توصلت لهذه الإجابة؟ (أ

Results:

Suggested revision:

Appendix A 5.3 continued

8.3	My supervisor is helpful in getting the job done

مشرفي/ مسؤولي متساعد في إتمام العمل	8.3

Probes:

أعد صياغة السؤال بطريقتك؟ (أ+د)

Results:

Suggested revision:

Appendix A 5.3 continued

8.4	My supervisor is successful in getting people to work together
مشرفي/ مسؤولي ناجح في جعل الموظفين يعملون سويا	8.4

Probes:

كيف توصلت لهذه الإجابة؟ (أ)

Results:

Suggested revision:

Circled Items

Question:

Probes:

Results:

Suggested revision:

Appendix A 5.4 Data Collection Form for Cognitive Interviewing

Participant:	Consented for recording:	Date:	Age:
Start:	End:	Gender:	Education:
Job (C/O):	Grade:	Time to fill survey:	Allocated ID:
Clarity:	Appropriateness:	Cultural Relevance:	Comprehension:

Summary of Interview findings with suggested changes:

Table A 5.5 Final changes made to the survey after the cognitive interviewing

Question number	Challenging phrases or words	Decision and reason
7.2	The phrase 'take personal interest in me' is in appropriate in particular for female audience.	Decision to add another word along with this to improve meaning يكترثون لأمري
7.4	Question is easily understood and there is no need to have it that long.	Recommended to use only term only to describe helpful
8.1	Supervisor takes care of those under him could cause confusion as this is a mandatory task for supervisors	Add 'cares for the matter of' in addition to takes cares to improve understanding of the question
8.2	The wording of the question يعير إنتباه 'pays attention' was considered very formal question.	Decision to change the term to يعطي إنتباه to make it more appropriate for target population.
8.4	The word سويا or 'together' is not enough to describe meaning of the question. As this term is close to treating people equally and interviewees thought that the question means that the supervisors is successful in giving tasks eually.	The use of يعملون مع بعضهم بروح الفريق to describe the meaning of the question as intended.
9.2	Working hard was difficult to interpret as interviewees thought it means physical workload.	Working hard changes to مجهود ذهني ونفسي عالي which indicates psychological effort as a job control dimension.
9.4	The negative statement 'I do not suffer' caused difficulty as it made it confusing for interviewees to answer the question	Questions format changes to 'I suffer' and then answer will be recoded in derivation of job demand score.

Document A 5.6 The Occupational Health and Safety Survey

1	بعد قراءتك لأهداف البحث، هل توافق على المشاركة في هذا الإستبيان؟	1 أوافق 2 لا أوافق
2	البيانات الديموغرافية	الخيارات
2.1	ماهو عمرك؟	
2.2	ماهو جنسك؟	2 ذكر 1 أنثى
2.3	ماهي أعلى درجاتك العلمية؟	2 لم أتخرج من الثانوية العامة 1 خريج / خريجة ثانوية عامة 4 شهادة دبلوم / بكالوريوس 3 شهادة دراسات عليا
2.4	ماهي حالتك الإجتماعية؟	2 لم يسبق لي الزواج 1 متزوج / متزوجة 3 متزوج / متزوجة سابقا (انفصال أو ترمل)
2.5	إذا كنت متزوج/ متزوجة، ماهو وضع زوجك أو زوجتك الوظيفي؟	3 لايعمل / لاتعمل 2 يعمل / تعمل 1 متقاعد/ متقاعدة
2.6	كم عدد سنوات خدمتك لدى الوزارة؟	4 3 سنوات أوأقل 3 4-7 سنوات 2 8-11 سنة 1 12 سنة أو أكثر
3	الصحة العامة والتقاعد	الخيارات
3.1	بشكل تقريبي، ماهو مجموع أيام إجازاتك المرضية خلال 12 شهرا الماضية؟	4 لايوجد 3 1- 3 أيام 2 4 -7 أيام 1 8- 28 يوم 6 29- 90 يوم 5 91 يوم أو أكثر
3.2	على مدى الـ12 شهرا الماضية، تستطيع أن تقول بأن صحتك:	5 ممتازة 4 جيدة جدا 3 جيدة 2 لابأس بها 1 سيئة
3.3	هل فكرت مسبقا في الحصول على التقاعد المبكر (بعد إكمال مدة الخدمة المطلوبة)وقبل وصولك لسن التقاعد القانوني (60 سنة)؟	3 لا لم يخطر لي 2 نعم، أحيانا 1 نعم، غالبا 4 قد تقدمت بطلب التقاعد مسبقا
3.4	إذا كانت إجابة للسؤال السابق "نعم" وكنت تنوي التقاعد المبكر ماهو السبب الرئيسي لهذه النية؟ "اختر إجابة واحدة فقط"	1 سوء الحالة الصحية 2 سوء الحالة الصحية لقريب/ صديق 3 لقدرتي على إدارة وضعي المادي من راتب التقاعد والمصادر الأخرى 4 للإستمتاع بالحياة وقضاء وقت أكثر مع شريك الحياة/العائلة 5 سئمت من العمل وأرغب بالتغيير (ربما وظيفة أخرى) 6 لإعطاء فرصة للجيل الشاب 7 لاسبب من المذكور أعلاه
3.5	كم مرة خلال ال 12 شهرا الماضية ذهبت للعمل على الرغم من أنه من المفروض أن تأخذ إجازة مرضية	4 أبدا 3 مرة واحدة 2 2 - 5 مرات 1 6 مرات أو أكثر 5 لم أمرض خلال هذه الفترة

Document A 5.6 continued

4	العائلة والحياة الإجتماعية	الخيارات
4.1	كم عدد الأطفال لديك الذين تقل أعمارهم عن 18 سنة؟	[4] لايوجد [3] 1- 2 [2] 3- 5 [1] 6 أو أكثر
4.2	بصفة عامة، مامدى رضاك عن الجمع / التوافق بين الحياة المهنية والحياة العائلية؟	[4] غيرراض تماما [3] غيرراض [2] راض [1] راض تماما
4.3	عموما، مامدى رضاك عن الدعم الإجتماعي الذي تتلقاه من أشخاص خارج العمل مثل أفراد أسرتك، أقاربك، أصدقائك وآخرين؟	[4] غيرراض تماما [3] غيرراض [2] راض [1] راض تماما
4.4	كم مرة تلتقي مع أصدقاء أو أقارب خارج عائلتك المباشرة؟	[2] بشكل شبه يومي [1] مايقارب مرة واحدة أسبوعيا [5] تقريبا مرة واحدة شهريا [4] أقل من المذكور [3] لا ألتقي بهم أبدا
4.5	خلال ال 12 شهرا الماضية، كم عدد الأحداث السلبية / المأساوية التي واجهتها مثل وفاة شخص مقرب، إنفصال من زواج أو صداقة طويلة الأمد؟	[4] لا يوجد [3] 1 [2] 2 – 3 [1] 4 أو أكثر

5	العمل	الخيارات
5.1	رجاء، حدد (أكتب) مسماك الوظيفي	
5.2	ماهي رتبتك الوظيفية؟	[2] شرطي إلى رقيب [1] رقيب أول إلى مساعد أول [5] ملازم إلى نقيب [4] رائد إلى مقدم [3] عقيد فما فوق [6] إذا كنت على الملاك المدني ماهي درجتك الوظيفيه؟ .....
5.3	ماهي طبيعة وقت عملك؟	[2] دوام رسمي صباحي [1] دوام عمل ظهرا [3] دوام عمل ليلي [4] عمل منقسم (فترة راحة ساعات قليلة بين كل مناوبة) [5] مناوبة عمل غير منتظمة (مناوبات متنوعة وغير منتظمة المدة و التوقيت) [6] مناوبة عمل دورية ومنتظمة (مناوبات مختلفة معروفة المدة والتوقيت)
5.4	ماهي المدة المعتادة لعملك/ مناوبتك؟	[3] أقل من 8 ساعات [2] 8- 11 ساعة [1] 12 ساعة أو أكثر
5.5	ماهو جنس غالبية الموظفين الذين تعمل معهم غالب وقتك؟ "اختر إجابة واحدة فقط" مثلاً: إذا كنت تعمل مع 10 موظفين غالبيتهم من الرجال يكون الجواب للسؤال "ذكر"	[2] ذكر [1] أنثى

Document A 5.6 continued

يرجى التأكد من إجابة أسئلة الصفحة السابقة

6	تقدير المهارات وإتخاذ القرارات	غير موافق بشدة	غير موافق	موافق	موافق بشدة
		إختر إجابة واحدة لكل سؤال			
6.1	وظيفتي تتيح لي إتخاذ الكثير من القرارات بمفردي	4	3	2	1
6.2	وظيفتي تتطلب مني أن أكون مبدعا	4	3	2	1
6.3	وظيفتي تحتوي على الكثير من العمل المتكرر	4	3	2	1
6.4	وظيفتي تتطلب درجة عالية من المهارات	4	3	2	1
6.5	أقوم بمجموعة متنوعة من الأعمال في وظيفتي	4	3	2	1
6.6	وظيفتي تتطلب أن أتعلم أشياء جديدة	4	3	2	1
6.7	في وظيفتي لدي الكثير من الحرية في اختيار الطريقة المناسبه لأداء العمل	4	3	2	1
6.8	لدي قدرة كبيرة في اختيار مهام وواجبات عملي	4	3	2	1
6.9	في وظيفتي لدي الفرصة لتطوير قدراتي الخاصة	4	3	2	1
7	دعم زملاء العمل				
7.1	زملائي في العمل مؤهلون في أداء مهامهم	4	3	2	1
7.2	زملائي في العمل يهتمون/ يكترثون لأمري	4	3	2	1
7.3	زملائي في العمل لطفاء في التعامل معي	4	3	2	1
7.4	زملائي في العمل متساعدون في إنجاز العمل	4	3	2	1
8	دعم المشرفين				
8.1	مشرفي/ مسؤولي في العمل يهتم برعاية / أمر من هم تحت إمرته (إشرافه)	4	3	2	1
8.2	مشرفي/ مسؤولي يعبر/ يعطي إنتباه لما أقوله في العمل	4	3	2	1
8.3	مشرفي/ مسؤولي متساعد في إنجاز العمل	4	3	2	1
8.4	مشرفي/ مسؤولي ناجح في جعل الموظفين يعملون مع بعضهم بروح الفريق	4	3	2	1

Document A 5.6 continued

9	متطلبات الوظيفة النفسية (الذهنية)	غير موافق بشدة	غير موافق	موافق	موافق بشدة
		إختر إجابة واحدة لكل سؤال			
9.1	وظيفتي تتطلب العمل بسرعة كبيرة	4	3	2	1
9.2	وظيفتي تتطلب العمل بمجهود ذهني ونفسي عال جداً	4	3	2	1
9.3	لدي الوقت الكافي في وظيفتي لإتمام العمل	4	3	2	1
9.4	أعاني في وظيفتي من تضارب طلبات الأخرين	4	3	2	1
9.5	وظيفتي تتطلب القيام بكمية هائلة من الأعمال	4	3	2	1

10	رأيك بأنظمة وإجراءات الصحة والسلامة المهنية	غير موافق بشدة	غير موافق	موافق	موافق بشدة	لا أعرف
		اختر إجابة واحدة لكل سؤال				
10.1	منهجية أو سياسة الصحة والسلامة المتبعة في مؤسستي لها أهداف ورؤية واضحة	5	4	3	2	1
10.2	منهجية أو سياسة الصحة والسلامة في مؤسستي تحدد بوضوح أدوار ومسؤوليات مختلف الشركاء	5	4	3	2	1
10.3	أساهم بمعرفتي وخبرتي في وضع أهداف وخطط الصحة والسلامة في العمل	5	4	3	2	1
10.4	يتم تطبيق مختلف أساليب التواصل سواء الكتابية، اللفظية أو السلوكية لتحقيق أهداف الصحة والسلامة في العمل	5	4	3	2	1
10.5	كلما دعت الحاجة تقوم المؤسسة بتوفير التدريب اللازم في إجراءات الصحة والسلامة لضمان كفاءة وإستعداد الموظفين	5	4	3	2	1
10.6	أنظمة الصحة والسلامة للسيطرة على المخاطر المتبعة لدى مؤسستي (مثل الأقنعة، القفازات والملابس الوقائية، أغطية الوجه والعينين، أنظمة التهوية إلخ..) تتناسب مع المخاطر المهنية لوظيفتي	5	4	3	2	1
10.7	أداء المؤسسة في مجال الصحة والسلامة يقاس بشكل دوري من قبل إدارتي وأقسام أخرى معنية برعاية الموظفين	5	4	3	2	1

Document A 5.6 continued

يرجى التأكد من إجابة أسئلة الصفحة السابقة

11	القدرة على العمل	الخيارات
	لنفترض أن قدرتك على العمل في أفضل حالة تعادل 10 نقاط. كم عدد النقاط التي تستطيع إعطاءها لتقييم قدرتك على العمل حاليا؟ (اختر رقماً واحداً)	أفضل قدرة على العمل 10 ⟷ 0 غيرقادر على العمل 0 1 2 3 4 5 5 7 8 9 10

12	التنقل للعمل	الخيارات
	كم من الوقت تأخذ (تستغرق) للوصول للعمل كل يوم (رحلة واحدة)؟	☐ 3 أقل من 15 دقيقة ☐ 2 15- 29 دقيقة ☐ 1 30- 59دقيقة ☐ 5 1- 1.5 ساعة ☐ 4 أكثر من ساعة ونصف

13	بيئة العمل	كل الوقت	تقريبا كل الوقت	ثلاثة أرباع الوقت	نصف الوقت	ربع الوقت	تقريبا أبدا	أبدا
13.1	بإستخدام المقياس التالي، من فضلك أخبرني مامدى تعرضك للتالي	اختر إجابة واحدة لكل سؤال						
13.1.1	الإهتزازات من السيارات أو الأدوات اليدوية أو المكائن أو أجهزة أخرى	☐ 7	☐ 6	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
13.1.2	الضجيج العالي الذي يتطلب منك التحدث بصوت مرتفع مع الآخرين	☐ 7	☐ 6	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

13.2	بإستخدام المقياس ذاته، هل يتضمن/ يتطلب عملك الرئيسي التالي:	كل الوقت	تقريبا كل الوقت	ثلاثة أرباع الوقت	نصف الوقت	ربع الوقت	تقريبا أبدا	أبدا
		اختر إجابة واحدة لكل سؤال						
13.2.1	العمل في أوضاع متعبة أو مؤلمة	☐ 7	☐ 6	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
13.2.2	رفع الأشخاص أو نقلهم	☐ 7	☐ 6	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
13.2.3	حمل أو نقل الأغراض الثقيلة	☐ 7	☐ 6	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
13.2.4	العمل واقفا	☐ 7	☐ 6	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
13.2.5	القيام بأعمال متكررة لليد أو الذراع	☐ 7	☐ 6	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
13.2.6	العمل بإستخدام أجهزة الكمبيوتر. الشاشات أو الشبكات	☐ 7	☐ 6	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
13.2.7	التعامل مع العملاء الغاضبين	☐ 7	☐ 6	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

Document A 5.6 continued

14	الصحة ونمط الحياة	الخيارات
14.1	ماهو وضعك الحالي بالنسبة لتدخين السيجارة	☐3 لم أدخن أبدا ☐2 كنت أدخن سابقا ☐1 أدخن 1-9 سيجارة يوميا ☐5 أدخن 10-19 سيجارة يوميا ☐4 أدخن 20 سيجارة أو أكثر يوميا
14.2	ماهو وضعك الحالي بالنسبة لتدخين الشيشة	☐2 كنت أدخن سابقا ☐1 لم أدخن أبدا ☐3 عادة أدخن شهريا (على الأقل مرة شهريا). كم رأس شيشة دخنت في الشهر الماضي ☐ ☐4 عادة أدخن أسبوعيا (على الأقل مرة أسبوعيا). كم رأس شيشة دخنت في الأسبوع الماضي ☐ ☐5 عادة أدخن يوميا (على الأقل مرة يوميا أوفي غالب أيام الأسبوع) كم رأس شيشة تدخن تقريبا في اليوم؟ ☐
14.3	ماهو وضعك الحالي بالنسبة لتدخين المدواخ أو الدوخة	☐3 لم أدخن أبدا ☐2 كنت أدخن سابقا ☐1 أدخن 1- 3 مرات يوميا ☐6 أدخن 4- 6 مرات يوميا ☐5 أدخن 6- 9 مرات يوميا ☐4 أدخن 10 مرات أو أكثر يوميا
14.4	من فضلك حدد وزنك بالكيلوغرام	☐ كجم
14.5	من فضلك حدد طولك بالسنتيمتر	☐ سم
14.6	الأنشطة البدنية: في وقت فراغك كم مرة تشارك في التالي:	
14.6.1	أنشطة تتطلب جهد خفيف (مثل التسوق للأطعمة أو غيره. الطبخ أورش الماء على الزرع)	☐1 ثلاث مرات أو أكثر كل أسبوع ☐2 مرة أو مرتان أسبوعيا ☐3 تقريبا من 1-3 مرات شهريا ☐4 أبدا / نادرا
14.6.2	أنشطة تتطلب جهد متوسط أو معتدل (مثل صيد السمك. أعمال الزراعة. رياضة المشي الخفيف. لعبة البلياردو. السباحة الخفيفة: تمارين صالة رياضية خفيفة)	☐1 ثلاث مرات أو أكثر كل أسبوع ☐2 مرة أو مرتان أسبوعيا ☐3 تقريبا من 1-3 مرات شهريا ☐4 أبدا / نادرا
14.6.3	أنشطة تتطلب جهد شديد أو عنيف (مثل المشي السريع أو الهرولة. الركض. السباحة الشاقة. كرة القدم. تمارين صالة رياضية متوسطة إلى شاقة)	☐1 ثلاث مرات أو أكثر كل أسبوع ☐2 مرة أو مرتان أسبوعيا ☐3 تقريبا من 1-3 مرات شهريا ☐4 أبدا / نادرا

14.7	من فضلك اذكر متوسط عدد الساعات التي تقضيها في هذة الأنشطة أسبوعيا	متوسط الساعات أسبوعيا
14.7.1	أنشطة تتطلب جهد خفيف	☐ ساعة أسبوعيا
14.7.2	أنشطة تتطلب جهد متوسط أو معتدل	☐ ساعة أسبوعيا
14.7.3	أنشطة تتطلب جهد شديد أو عنيف	☐ ساعة أسبوعيا

Document A 5.6 continued

15	ربط نتائج الإستبيان بالملف الطبي	
15.1	نأمل أن يتم ربط نتائج الإستبيان الخاص بك مع ملفك الطبي ومراجعاتك الطبية المستقبلية والتي ستكون تحت إطار بحوث ودراسات الوزارة في مجال الصحة والسلامة المهنية مع التعهد بالحفاظ على سرية بياناتك وعدم الإستدال بأي من معلوماتك الشخصية لأي جهة. هل توافق على ذلك؟	☐ 2 أوافق ☐ 1 لا أوافق
15.2	إذا كانت إجابتك في السؤال السابق ب "أوافق". يرجى كتابة الرقم الوظيفي (العسكري)	

Table A 5.7 Pilot study mean scores of the scales and subscales of the Arabic JCQ (22 items)

Scale	N	No. of items	Mean	SD	Min-max scores	Min-Max attainable
Psychological demand	73	5	34.15	5.14	23-43	12-48
Job control	73	9	66.50	11.83	34-90	24-96
Skill discretion	75	6	33.50	5.40	18-44	12-48
Decision Authority	74	3	32.81	7.63	12-48	12-48
Workplace support	74	8	24.97	3.34	11-32	8-32
Co-workers support	74	4	12.30	1.98	5-16	4-16
Supervisors support	77	4	12.59	1.96	6-16	4-16

Table A 5.8 Pilot study mean scores of the scales and subscales of the Arabic JCQ in comparison with the US population study

Scale	Mean	SD	Mean US Work and Health Study (2007) (n=4,495)	SD	Differences in mean (pilot study – US study)
Psychological demand	34.15	5.14	30.90	8.48	+3.25
Job control	66.50	11.83	70.30	15.6	- 3.80
Skill discretion	33.50	5.40	33.50	8.50	0.0
Decision Authority	32.81	7.63	36.80	9.90	-3.99
Workplace support	24.97	3.34	24.60	4.26	+0.37
Co-workers support	12.30	1.98	12.73	2.53	-0.43
Supervisors support	12.59	1.96	11.94	4.85	+0.65

Table A 5.9 Pilot study internal consistency results for the Arabic JCQ (22 items)

Subscale items	Mean	SD	Item test[1]	Item Rest[2]	Alpha if item is deleted	Standardized Alpha of the subscale
Skill discretion (SD)						***0.82***
Requires creativity ***(CQ2)***	3.00	0.71	0.78	0.67	0.77	
Repetitive work ***(CQ3)***	2.97	0.81	0.62	0.43	0.82	
High skills level ***(CQ4)***	2.90	0.78	0.84	0.73	0.75	
Variety ***(CQ5)***	2.94	0.77	0.70	0.54	0.79	
Learn new things ***(CQ6)***	3.02	0.76	0.78	0.66	0.77	
Develop own skills ***(CQ9)***	2.83	0.80	0.63	0.44	0.82	
Decision Authority (DA)						***0.74***
Allows own decisions ***(CQ1)***	2.64	0.77	0.74	0.45	0.78	
A lot of freedom ***(CQ7)***	2.73	0.85	0.87	0.64	0.56	
A lot of say ***(CQ8)***	2.75	0.75	0.85	0.62	0.59	
Job control (SD and DA)						***0.86***
Psychological demand						***0.70***
Very fast ***(DQ1)***	2.97	0.79	0.67	0.47	0.64	
Very hard ***(DQ2)***	3.19	0.64	0.72	0.58	0.60	
Enough time ***(DQ3)***	2.89	0.72	0.49	0.23	0.72	
Suffer conflicts ***(DQ4)***	2.21	0.90	0.66	0.41	0.65	
Excessive work ***(DQ5)***	2.18	0.77	0.73	0.53	0.61	
Co-workers support (CS)						***0.80***
Competent ***(CSQ1)***	3.00	0.62	0.77	0.57	0.75	
*Interest in me****(CSQ2)***	2.97	0.69	0.81	0.62	0.75	
*Friendly****(CSQ3)***	3.18	0.55	0.79	0.64	0.74	
*Helpful****(CSQ4)***	3.17	0.70	0.82	0.64	0.74	
Supervisor's support (SS)						***0.89***
Concerned welfare ***(SSQ1)***	3.03	0.57	0.85	0.72	0.75	
Pays attention ***(SSQ2)***	3.14	0.47	0.89	0.81	0.76	
Helpful ***(SSQ3)***	3.20	0.59	0.89	0.78	0.75	
Good organizer ***(SSQ4)***	3.20	0.61	0.86	0.72	0.74	
Workplace support (CS and SS)						***0.86***

[1] Item test indicates correlation between individual items with total items in subscale. [2] Item rest: correlation between an item and the scale that is formed by all other items excluding the one being examined.

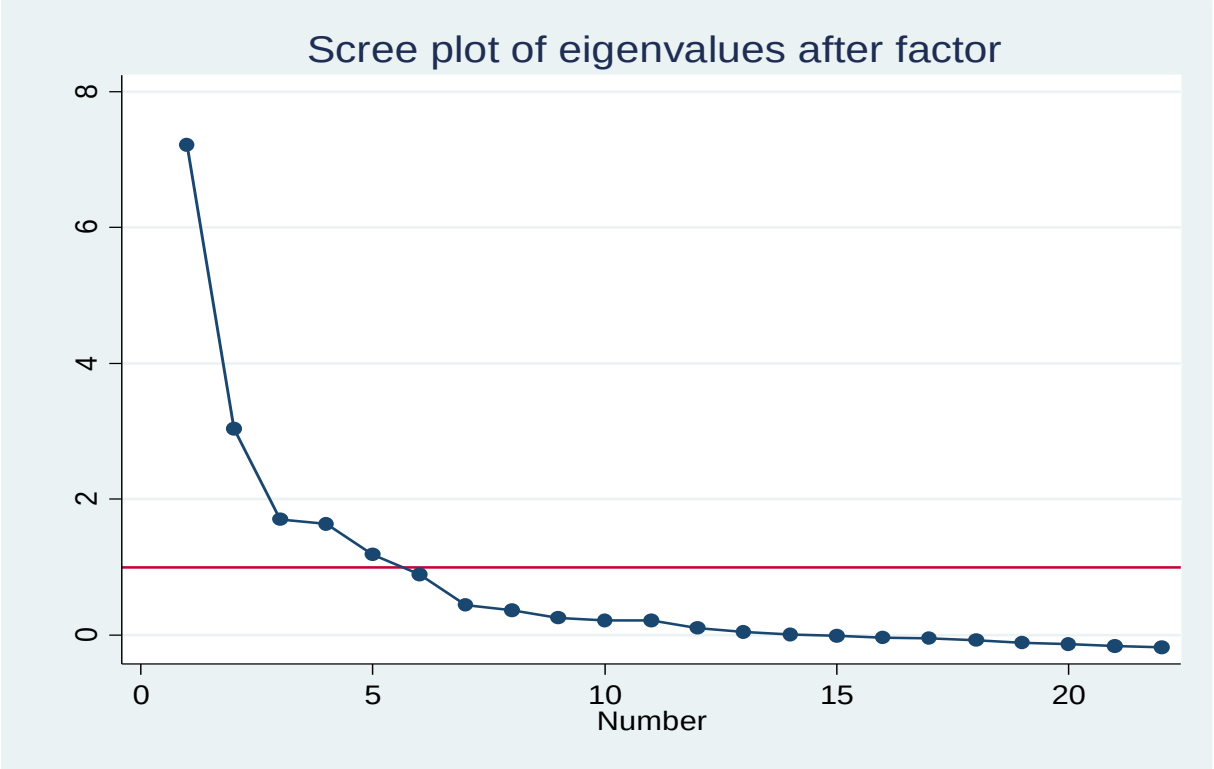

Figure A 5.10 Eigen-value results to determine number of factors for loading analysis

Table A 5.11 Pilot study factor analysis of the 22 item Arabic JCQ (N = 78)

Subscale items	Factors				
	F1	**F2**	**F3**	**F4**	**F5**
Skill discretion (SD)					
Requires creativity ***(CQ2)***	0.71			0.30	
Repetitive work ***(CQ3)***	0.48			0.59	
High skills level ***(CQ4)***	0.69				
Variety ***(CQ5)***	0.62				
Learn new things ***(CQ6)***	0.46		0.60		
Develop own skills ***(CQ9)***	0.39		0.77		
Decision Authority (DA)					
Allows own decisions ***(CQ1)***	0.64				
A lot of freedom ***(CQ7)***	0.69				
A lot of say ***(CQ8)***	0.53	0.33	0.44		
Psychological demand					
Very fast ***(DQ1)***					0.74
Very hard ***(DQ2)***	0.46				0.66
Enough time ***(DQ3)***	0.31				
Suffer conflicts ***(DQ4)***	0.60	-0.30			
Excessive work ***(DQ5)***	0.78				
Co-workers support (CS)					
Competent ***(CSQ1)***			0.58	0.50	0.34
Interest in me ***(CSQ2)***			0.81		
Friendly ***(CSQ3)***				0.71	
Helpful ***(CSQ4)***				0.75	
Supervisor's support (SS)					
Concerned welfare ***(SSQ1)***		0.73			0.39
Pays attention ***(SSQ2)***		0.86			0.37
Helpful ***(SSQ3)***		0.89			
Good organizer ***(SSQ4)***		0.76			
Eigen Value	7.1	3.0	1.6	1.6	1.1
Variation explained	4.6	3.3	2.6	2.2	1.8
Variation explained %	32	23	18	14	13

The loading values are shown for loadings with an absolute value >0.30.

Table A 5.12 Results of the test re-test reliability of the Arabic JCQ (n=15)

Arabic JCQ dimension	ICC*
Psychological job demand	0.22 (-0.48-0.51)
Job Control	0.54 (0.65-0.82)
Skill Discretion	0.72 (0.34-0.89)
Decision Autonomy	0.59 (0.16-0.84)
Workplace support	0.50 (-0.01-0.80)
Co-workers support	0.71 (0.35-0.89)
Supervisors support	0.33 (-0.21-0.71)

*Intraclass correlation coefficient.

Appendix Document A 6.1 Approval to use occupational health data of the police such as sickness absnece and disability retirement for research purposes. (Letter from Minister's office to Abu Dhabi Police Medical Services)

United Arab Emirates
Ministry of Interior
Abu Dhabi Police G.H.Q
The Court

دولة الإمارات العربية المتحدة
وزارة الداخلية
القيادة العامة لشرطة أبوظبي
إدارة الديوان

الرقـم : ٢٠٠٠ - ٥٤٨١/١١/٣٣
التاريـخ : ٢٠١٢/٠٣/٢١ م
الموافـق : ٢٧/ربيع الثاني /١٤٣٣ هـ

مدير إدارة الخدمات الطبية

الموضوع : الإحصائيات/ الدراسات العليا

الإشارة : كتابكم رقم ٣٣ / ١١ / ٢٠٧٣٤ تاريخ ٢٥ / ١٢ / ٢٠١١م

نحيل إليكم نسخة عن كتاب مدير إدارة شؤون الموظفين رقم ٢٠٠٠ - ٢٨ / ٣ / ٥٢٠٤ تاريخ ١٩ / ٣ / ٢٠١٢م والمتضمن بأنه لا مانع لديهم من منح الملازم أول رقم (٤١٣٢١) فيصل أحمد محمد الكعبي الإحصائيات عن الإجازات المرضية والتقاعد المبكر لأسباب صحية لمنتسبي القيادة العامة لشرطة أبوظبي .

للتفضل بالإطلاع وإجراءاتكم علماً بأنه لا مانع من منح المذكور أعلاه إحصائيات إصابة العمل بعد أن يتم أخذ رأي إدارة الشؤون القانونية .

واقبلوا الإحترام ،،،

[redacted]

رؤيتنا: أن نضمن استمرار إمارة أبوظبي كمجتمع ينعم بالأمن والسلامة من خلال تقديم خدمات شرطية عالية الجودة للمواطنين والمقيمين في الإمارة وزوارها

١٥٧٣٤٠ - ٢٠١٢/٠٧/٠١

Document A 6.1 continued (Letter from the Legal Affairs Administration to Abu Dhabi Police Medical Services)

United Arab Emirates
Ministry of Interior
Abu Dhabi Police G.H.Q
Legal Affairs Admin

دولة الإمارات العربية المتحدة
وزارة الداخلية
القيادة العامة لشرطة أبوظبي
إدارة الشوون القانونية

الرقـــم : ٢٠٠٠ - ٧٧٧٠/٢/٨
التاريـــخ : ٢٠١٢/٠٧/٢٤ م
الموافـــق : ٠٥/رمضان /١٤٣٣ هـ

مدير إدارة الخدمات الطبية

السلام عليكم ورحمة الله وبركاته ،،،

الموضوع : الاحصائيات / الدراسات العليا

الاشارة : كتاب مدير ادارة الديوان رقم ٣٣ / ١١ / ٥٤٨١ تاريـــــــــخ ٢١ / ٣ / ٢٠١٢م .

- نفيد أننا لم نجد في القانون مايحظر إعطاء مثل هذه المعلومات طالما أنها بيانات عامة ولم تحصل لغايات الاحصاء ، ذلك أن السرية الاحصائية وفقا لما ورد بالقانون رقم ٧ لسنة ٢٠٠٨ في شأن مركز الاحصاء بأبوظبي وكذلك القانون الاتحادي رقم ٩ لسنة ٢٠٠٩ في شأن المركز الوطني للاحصاء هي ضمان عدم الافصاح عن البيانات الفردية المتحصل عليها لغايات الاحصاء ، وأن المقصود بالبيانات الفردية هي المعلومات والخصائص الوصفية التي تحدد هوية المبحوث ، وحيث أن المعلومات التي يطلبها الملازم أول / فيصل أحمد محمد الكعبي هي مجرد إحصائية بالارقام وليست لغايات الاحصاء وإذا لمتطلبات دراسية فإننا لانجد مانعا قانونيا من تلبيه طلب المذكور .
- للتفضل بالعلم واجراءاتكم .

واقبلوا الاحترام ،،،

[redacted]

نسخة الى :
- مدير إدارة الديوان - للعلم .
- ٢٠١٢/٠٧/٢٣ - ١٥٨٣١٤

رؤيتنا: أن نضمن استمرار إمارة أبوظبي كمجتمع ينعم بالأمن والسلامة من خلال تقديم خدمات شرطية عالية الجودة للمواطنين والمقيمين في الإمارة وزوارها

٢٠١٢/٠٨/٠٢ - ٤١٣٢١

Document A 6.2 Ethical Approval from obtained from the Health Authority of Abu Dhabi (HAAD) which was reviewed by the Abu Dhabi Research Ethics Committee (ADREC).

From: [redacted]
Sent: Thursday, January 09, 2014 9:00:22 AM
To: [redacted]
Cc: [redacted]

Dear Captain Faisal:
I received response from Mr. Amro regarding your approval. Mr. Amro explained that you should have received the email copied below from HAAD DG Office on 17 December indicating that ADREC approval meets all HAAD requirements.

You received ADREC approval on 1 October 2013. Therefore, you may proceed with your research project.

Thank you and best wishes,
Omar

Omar Shafey, PhD, MPH
Manager (Acting)
Zayed Complex for Herbal Research and Traditional Medicine
Senior Officer, Medical Research
Public Health & Research Division
Health Authority - Abu Dhabi
P.O. Box 5674, Abu Dhabi
United Arab Emirates
Office: +971 2 504 8330
Mobile: +971 50 666 1349
Email: [redacted]
Website: www.haad.ae/research

Document A 6.3 Letter of request to allow the distribution of Occupational Health and Safety Surveys (Letter from the Human Resource General Directorate to Capital Police Directorate

United Arab Emirates
Ministry of Interior
Abu Dhabi Police G.H.Q
Human Resources G.D
Education Ad
Students Affairs Department

دولة الإمارات العربية المتحدة
وزارة الداخلية
القيادة العامة لشرطة أبوظبي
الإدارَة العَامَّة لِلمَوَارِد البَشَرِيَّة
إدارة التعليم
قسم شؤون الطلاب

الرقـــم : 10654/31/14 - 2000
التاريـــخ : 2014/08/28 م
الموافـــق : 02/ذو القعدة /1435 هـ

مدير مديرية شرطة العاصمة

الموضوع : البعثات الدارسية

لاحقا لكتابنا رقم 7491/11/33 بتاريخ 2012/08/08م

نشركم على حسن تعاونكم الدائم معنا ، نود إعلامكم بأن النقيب رقم (41321) فيصل احمد محمد الكعبي قد تقرر إيفادة للمملكة المتحدة لإستكمال دراسة العليا الدكتوراه بتخصص (الصحة و السلامة) اعتبارا من تاريخ 09/24/ 2012م ولغاية تاريخ 2016/09/15م ، كما هو موضح في كتابنا المشار إليه أعلاه، عليه نرجوا الإيعاز لمن يلزم نحوتسهيل مهمة المذكور في جمع المعلومات الخاصة بدراسته للتفضل بالعلم واجراءاتكم.

واقبلو الاحترام،،،

[redacted]

2014/08/28 - 161236
4740

رؤيتنا: أن نضمن استمرار إمارة أبوظبي كمجتمع ينعم بالأمن والسلامة من خلال تقديم خدمات شرطية عالية الجودة للمواطنين والمقيمين في الإمارة وزوارها

2015/01/27 - 42262

Document A 6.3 continued (Letter from the Director to all Departments within the Capital Police Directorate)

United Arab Emirates
Ministry of Interior
Abu Dhabi Police G.H.Q
Capital Police Directorate

دولة الإمارات العربية المتحدة
وزارة الداخلية
القيادة العامة لشرطة أبوظبي
مديرية شرطة العاصمة

الرقـم : 825/31/14 - 2000
التاريـخ : 2015/01/25 م
الموافـق : 04/ربيع الثاني /1436 هـ

مدراء المراكز
رئيس قسم متابعة المخالفين والأجانب
رئيس قسم شؤون التحقيق

الموضوع : البعثات الدارسية

بالإشارة إلى كتاب رقم 10654/31/14 بتاريخ 2014/08/28

- نشركم على حسن تعاونكم الدائم معنا ،وبخصوص تسهيل مهمة النقيب ر قم (41321) فيصل احمد محمد الكعبي الموفد الى المملكة المتحدة لإستكمال دراسة العليا (الدكتوراه) بتخصص الصحة و السلامة .
- يرجى التكرم بالايعاز لمن يلزم نحو استيفاء الاستبيانات الخاصه بموضوع الدراسة المشار اليه وتجميع تلك الاستبيانات واعادتها الى فرع التخطيط والدراسات بالمديرية خلال اسبوعين من تاريخه علمنا بان النقيب المذكور سوف يقوم بزيارتكم وتزويدكم بالاستبيانات المطلوبه .
- للتفضل بالعلم واجراءاتكم.

واقبلو الاحترام،،،،

[redacted]

Table A 6.4 Independent variables; details, response options and source of questions

Variable group	Details	Response options	Source
Psychosocial factors	Nine job control items (six for skill discretion and three on decision authority), five job demand items, and eight workplace support items (four each on supervisors' and co-workers' support).	Responses based on a Likert scale ranging from 'strongly disagree' to 'strongly agree'. The scores from these responses were summed for each of the work factors. Using the distribution of data respondents were classified into high, medium and low categories.	The JCQ of Karasek's (1998)
Physical factors	Nine physical work factors; vibration, noise, working in painful positions, lifting people, carrying heavy objects, working while standing, work requiring repetitive hand-arm movements, working on screens and dealing with angry clients.	There were seven responses for each question, 'Never', 'Almost never', 'Quarter of the time', 'Half of the time', 'three quarters of the time', 'Almost all the time' and 'All the time'. Each physical exposure then classified into low (less than half of time) and high (half of the time or more). A combined physical exposure variable was created by adding the low (1) and high (2) responses from the nine physical exposure variable and then using the distribution of data to create low, moderate and high physical exposure categories.	Questions were based on the European Working Conditions Survey (2010).

Table A 6.4 continued

Variable group	Details	Response options	Source
Employees' perception of the health and safety management system	Seven questions; policy (two items, HSMS1 & 2), organizational arrangements (two items HSMS3 & 4), planning and implementation of health and safety measures (two items) (HSMS5 & 6) and audit and review of health and safety systems (one item) (HSMS6)	Responses ranged from strongly disagree to strongly agree. Each item was then reclassified into favourable (agree and strongly agree) and unfavourable (disagree and strongly disagree). An overall perception of health and safety management system HSMST variable was created by combining all these varaibles.	This is the first study to examine the influence of Employees' perceptions of health and safety management systems on sickness absence and early retirement intention have not been investigated previously

Table A 6.5 classification of study variables into work and non-work factors.

Work or Non-work factors	Factor group	Variables
	Demographic variables	Age Gender Education Marital Status Years of service Partner working status
Non-work factors	*Social life factors*	Number of children Work-life imbalance Tragic events Private life support Frequency of meeting friends
	Health and lifestyle indicators	Self-rated Health Presenteeism Work ability Smoking status (cigarettes, shisha and dokha) BMI Exercise
	Work settings	Civilian/officer Rank Working hours Work shift type Dominant gender at work Transportation time to work
	Psychosocial factors	Job control Job demand Co-workers support Supervisors support Workplace support Strain index or psychological work status
Work factors	*Physical work exposures*	Vibration Noise Working in painful positions Carrying people Lifting objects Repetitive arm/hand movement Working while standing Dealing with angry clients Working on screens
	Perceptions of Health and Safety Management systems	Seven questions covering employees perception of health and safety management system

Table A 6.6 Variables in the occupational health and safety survey, number of responses and missing counts for each variable.

No	variables	Observations	Missing counts	%
1	Age	608	139	18.2
2	Gender	664	83	10.9
3	Education	663	84	11.1
4	MS	663	84	11.1
5	Partner working	565	182	23.9
6	Years of service	653	94	12.3
7	Sickness Absence	670	77	10.1
8	General Health	664	83	10.9
9	Presenteeism	672	75	9.8
10	Number of children	651	96	12.6
11	Work and life imbalance	658	89	11.7
12	Private life support	671	76	10.0
13	Meeting friends	658	89	11.7
14	Tragic events	660	87	11.4
15	Grade	673	74	9.7
16	Work mode	661	86	11.3
17	Work hours	662	85	11.1
18	Dominant gender	673	74	9.7
19	ERI	663	84	11.0
20	Control	684	63	8.2
21	Demand	724	23	3.0
22	Co-workers support	720	27	3.5
23	Supervisors support	733	14	1.8
24	Health and safety	735	12	1.6
25	Work abilities	697	50	6.5
26	Transport	694	53	6.9
27	Vibration	691	56	7.3
28	Noise	682	65	8.5
29	Ergonomic	698	49	6.4
30	Carrying people	692	55	7.2
31	Lifting objects	696	51	6.7
32	Standing	691	56	7.3
33	Repetitive	697	50	6.5

Table A 6.6 continued

No	Variables	Observations	Missing counts	%
34	Screen	702	45	5.9
35	Angry clients	700	47	6.1
36	Smoking (cig)	696	51	6.7
37	Sheesha smoking	670	77	10.1
38	Dokha smoking	688	59	7.7
39	Weight	639	108	14.2
40	Height	629	118	15.5
41	Light exercise	697	50	6.5
42	Moderate exercise	698	49	6.4
43	Heavy exercise	697	50	6.5
44	Light exercise hours	517	230	30.2
45	Moderate exercise hours	503	244	32.1
46	Heavy exercise hours	466	281	36.9

Table A 6.7 Physical work factors and sickness absence.

			Days of Sickness absence (SA)				
Work factor	**n (%)**	**n with SA data**	**0d n (%)[2]**	**1-3d n (%)**	**4-7d n (%)**	**≥ 8d n (%)**	**Odds Ratio[1] (95% CI)**
Vibration							
< half of time	341 (49)	319	158 (50)	72 (23)	58 (18)	31 (10)	1
≥ half of time	350 (51)	311	161 (52)	76 (24)	44 (14)	30 (10)	0.80 (0.56-1.15)
Total	*691 (100)*	*630*	*319 (51)*	*148 (23)*	*102 (16)*	*61 (10)*	
Noise							
< half of time	423 (62)	393	195 (50)	82 (21)	79 (20)	37 (9)	1
≥ half of time	259 (38)	228	122 (54)	62 (27)	21 (9)	23 (10)	**0.57 (0.38-0.85)**
Total	*682 (100)*	*621*	*317 (51)*	*144 (23)*	*100 (16)*	*60 (10)*	
Working in painful positions							
< half of time	372 (53)	340	168 (49)	78 (23)	56 (16)	38 (11)	1
≥ half of time	326 (46)	292	153 (52)	70 (24)	46 (16)	23 (8)	0.80 (0.56-1.16)
Total	*698 (100)*	*632*	*321 (51)*	*148 (23)*	*102 (16)*	*61 (10)*	
Lifting people							
< half of time	428 (62)	389	200 (51)	88 (23)	59 (15)	42 (11)	1
≥ half of time	264 (38)	238	121 (51)	60 (25)	39 (16)	18 (8)	0.89 (0.61-1.30)
Total	*692 (100)*	*627*	*321 (51)*	*148 (24)*	*98 (16)*	*60 (10)*	
Carrying heavy objects							
< half of time	477 (69)	435	225 (52)	93 (21)	67 (15)	50 (11)	1
≥ half of time	219 (31)	195	94 (48)	55 (28)	35 (18)	11 (6)	**0.83 (0.56-0.92)**
Total	*696 (100)*	*630*	*319 (51)*	*148 (23)*	*102 (16)*	*61 (10)*	
Working while standing							
< half of time	358 (52)	327	151 (46)	80 (24)	57 (17)	39 (12)	1
≥ half of time	333 (48)	300	169 (56)	68 (23)	41 (14)	22 (7)	**0.63 (0.44-0.92)**
Total	*691 (100)*	*627*	*320 (51)*	*148 (24)*	*98 (16)*	*61 (10)*	
Repetitive hand/arm movements							
< half of time	311 (45)	284	133 (47)	68 (24)	51 (18)	32 (11)	1
≥ half of time	386 (55)	348	190 (55)	79 (23)	50 (14)	29 (8)	0.77 (0.49-1.01)
Total	*697 (100)*	*632*	*323 (51)*	*147 (23)*	*101 (16)*	*61 (10)*	
Working on screens							
< half of time	301 (43)	279	135 (48)	67 (24)	50 (18)	27 (10)	1
≥ half of time	401 (57)	356	190 (53)	81 (23)	52 (15)	33 (9)	0.82 (0.57-1.17)
Total	*702 (100)*	*635*	*325 (51)*	*148 (23)*	*102 (16)*	*60 (9)*	
Dealing with angry clients							
< half of time	367 (52)	338	173 (51)	77 (23)	53 (16)	35 (10)	1
≥ half of time	333 (48)	297	152 (51)	72 (24)	47 (16)	26 (9)	0.92 (0.64-1.32)
Total	*700 (100)*	*635*	*325 (51)*	*149 (23)*	*100 (16)*	*61 (10)*	

[1] Unadjusted odds ratio of having sickness absence of ≥4d compared with 0-3d in the full sample [2] Row percentages

Table A 6.8 Employees' perception of the health and safety management system dimension and sickness absence.

			Days of Sickness absence (SA)				
Work factor	**n (%)**	**n with SA data**	**0d n (%)[2]**	**1-3d n (%)**	**4-7d n (%)**	**≥ 8d n (%)**	**Odds Ratio[1] (95% CI)**
Clear vision and objectives of HSE Policy (HSMS1)							
Favourable	537 (52)	482	244 (51)	115 (24)	82 (17)	41 (9)	1
Unfavourable	203 (48)	184	95 (52)	44 (24)	23 (13)	22 (12)	0.94 (0.63-1.40)
Total	*740 (100)*	*666*	*339 (51)*	*159 (23)*	*105 (16)*	*63 (9)*	
HSE policy defines roles and responsibilities of different stakeholders (HSMS2)							
Favourable	525 (71)	476	238 (50)	110 (23)	84 (18)	44 (9)	1
Unfavourable	212 (29)	190	101 (53)	49 (26)	21 (11)	19 (10)	0.72 (0.48-1.08)
Total	*737 (100)*	*666*	*339 (51)*	*159 (24)*	*105 (16)*	*63 (9)*	
Employees' participation in setting HSE goals and plans (HSMS3)							
Favourable	537 (73)	489	247 (51)	114 (23)	81 (17)	47 (10)	*1*
Unfavourable	201 (27)	174	90 (52)	44 (25)	24 (14)	16 (9)	0.84 (0.56-1.26)
Total	*738 (100)*	*663*	*337 (51)*	*158 (24)*	*105 (16)*	*63 (10)*	
Various verbal and non-verbal communication methods used to implement HSE plans (HSMS4)							
Favourable	551 (75)	494	241 (49)	119 (24)	88 (18)	46 (9)	1
Unfavourable	183 (25)	165	93 (56)	39 (24)	16 (10)	17 (10)	0.67 (0.43-1.03)
Total	*734 (100)*	*659*	*334 (51)*	*158 (24)*	*104 (16)*	*63 (10)*	
HSE training is provided whenever needed (HSMS5)							
Favourable	519 (71)	468	231 (49)	109 (23)	80 (17)	48 (10)	1
Unfavourable	215 (29)	192	104 (54)	48 (25)	125 (13)	15 (8)	0.69 (0.46-1.04)
Total	*734 (100)*	*660*	*335 (51)*	*157 (24)*	*105 (16)*	*63 (10)*	

[1] Unadjusted odds ratio of having sickness absence of ≥4d compared with 0-3d in the full sample

[2] Row percentages

Table A 6.8 continued

			Days of Sickness absence (SA)				
Work factor	**n (%)**	**n with SA data**	**0d n (%)[2]**	**1-3d n (%)**	**4-7d n (%)**	**≥ 8d n (%)**	**Odds Ratio[1] (95% CI)**
Risk control systems match employees' work profile (HSMS6)							
Favourable	471 (64)	428	213	106	71 (17)	38 (9)	1
Unfavourable	264 (36)	233	121	53 (23)	34 (15)	25 (11)	0.97 (0.48-1.06)
Total	*735 (100)*	*661*	*334*	*159 (24)*	*105 (16)*	*63 (10)*	
HSE performance is audited and reviewed regularly (HSMS7)							
Favourable	502 (68)	453	233	106	73 (16)	41 (9)	1
Unfavourable	234 (32)	209	103	53 (25)	31 (15)	22 (11)	1.01 (0.69-1.47)
Total	*736 (100)*	*662*	*336*	*159 (24)*	*104 (16)*	*63 (10)*	

[1] Unadjusted odds ratio of having sickness absence of ≥4d compared with 0-3d in the full sample

[2] Row percentages

Table A 6.9 Non-work demographic factors and sickness absence.

			Days of Sickness absence (SA)				
Non-work factor	**n (%)**	**n with SA data**	**0d n (%)[2]**	**1-3d n (%)**	**4-7d n (%)**	**≥ 8d n (%)**	**Odds Ratio[1] (95% CI)**
Sickness absence		670	340 (51)	161 (24)	105 (16)	64 (10)	
Age groups							
18-29	279 (46)	273	136 (50)	71 (26)	44 (16)	22 (8)	1
30-39	236 (39)	235	124 (53)	56 (24)	36 (15)	19 (8)	0.96 (0.63-1.44)
40-49	80 (13)	79	50 (63)	6 (8)	12 (15)	11 (14)	1.28 (0.73-2.25)
≥50	13 (2)	13	7 (54)	1 (8)	0 (0)	5 (38)	1.96 (0.62-6.19)
Total	*608 (100)*	*600*	*317 (53)*	*134 (22)*	*92 (15)*	*57 (10)*	
Age per 10 years							1.13 (0.88-1.45)
Gender							
Males	604 (91)	597	319 (53)	142 (24)	82 (14)	54 (9)	1
Females	60 (9)	58	12 (21)	17 (29)	21 (36)	8 (14)	**3.38 (1.95-5.86)**
Total	*664 (100)*	*655*	*331 (51)*	*159 (24)*	*103 (16)*	*62 (9)*	
Education							
Postgraduate	29 (4)	29	15 (52)	8 (28)	4 (14)	2 (7)	1
Diploma/Bachelor	152 (21)	149	76 (51)	32 (21)	26 (17)	15 (10)	1.45 (0.55-3.38)
High school	334 (50)	331	161 (49)	89 (27)	58 (18)	23 (7)	1.24 (0.48-3.15)
Not a high school graduate	148 (22)	147	78 (53)	32 (22)	16 (11)	21 (14)	1.28 (0.48-3.41)
Total	*663 (100)*	*656*	*330 (50)*	*161 (24)*	*104 (16)*	*61 (10)*	
Marital status							
Married	469 (72)	464	234 (50)	112 (24)	75 (16)	43 (9)	1
Not married	184 (28)	183	91 (50)	47 (26)	26 (14)	19 (10)	0.95 (0.64-1.42)
Total	*653 (100)*	*647*	*325 (50)*	*159 (25)*	*101 (16)*	*62 (10)*	
Years of service							
≤3 years	56 (9)	55	30 (55)	14 (25)	2 (4)	9 (16)	1
4-7 years	199 (30)	197	81 (41)	62 (31)	39 (20)	15 (7)	1.51 (0.72-3.13)
8-11 years	166 (25)	163	88 (54)	43 (26)	22 (14)	10 (6)	0.97 (0.45-2.10)
≥12 years	232 (36)	229	131 (57)	37 (16)	34 (15)	27 (12)	1.45 (0.70-2.99)
Total	*653 (100)*	*644*	*330 (51)*	*156 (24)*	*97 (15)*	*61 (9)*	
Partner working							
Yes	202 (36)	199	77 (39)	51 (26)	47 (24)	24 (12)	1
No	363 (64)	359	205 (57)	79 (22)	44 (12)	31 (9)	**0.47 (0.32-0.70)**
Total	*565 (100)*	*558*	*282 (51)*	*130 (23)*	*91 (16)*	*55 (10)*	

[1] Unadjusted odds ratio of having sickness absence of ≥4d compared with 0-3d in the full sample

[2] Row percentages

Table A 6.10 Non-work social life factors and sickness absence.

			Days of Sickness absence (SA)				
Non-work factor	**n (%)**	**n with SA data**	**0d n (%)[2]**	**1-3d n (%)**	**4-7d n (%)**	**≥ 8d n (%)**	**Odds Ratio[1] (95% CI)**
Number of children >18 years old							
1-2	204 (31)	202	110 (54)	48 (24)	26 (13)	18 (9)	1.03 (0.64-1.65)
3-5	203 (31)	200	97 (49)	56 (18)	35 (18)	9 (5)	1.57 (0.99-2.47)
≥ 6	244 (38)	240	122 (51)	46 (19)	40 (17)	32 (13)	1.36 (0.63-2.94)
Total	*651 (100)*	*639*	*329 (51)*	*150 (23)*	*101 (16)*	*59 (9)*	
Work life balance							
Satisfied	513 (78)	503	251 (50)	124 (25)	85 (17)	43 (9)	1
Dissatisfied	145 (22)	143	74 (52)	33 (23)	16 (11)	20 (14)	0.98 (0.64-1.51)
Total	*658 (100)*	*646*	*325 (50)*	*157 (24)*	*101 (16)*	*63 (10)*	
Private social life support							
Satisfied	584 (87)	572	292 (51)	143 (25)	87 (15)	50 (9)	1
Dissatisfied	87 (13)	86	39 (45)	16 (19)	17 (20)	14 (16)	**1.78 (1.10-2.89)**
Total	*671 (100)*	*658*	*331 (50)*	*159 (24)*	*104 (16)*	*64 (10)*	
Frequency of meeting							
Almost daily	250 (38)	244	134 (55)	59 (24)	37 (15)	14 (6)	1
Once a week	274 (42)	269	140 (52)	57 (21)	43 (16)	29 (11)	1.38 (0.91-2.08)
Less than once a week	134 (20)	133	55 (41)	38 (29)	21 (16)	19 (14)	**1.62 (1.01-2.63)**
Total	*658 (100)*	*646*	*329 (51)*	*154 (24)*	*101 (16)*	*62 (10)*	
Number or tragic events last 12 months							
None	262 (40)	254	152 (60)	53 (21)	31 (12)	18 (7)	1
1	194 (29)	193	95 (49)	54 (28)	22 (11)	22 (11)	1.23 (0.78-1.95)
≥ 2	204 (39)	200	82 (41)	48 (24)	47 (24)	23 (12)	**2.25 (1.74-3.40)**
Total	*660 (100)*	*247*	*329 (51)*	*155 (24)*	*100 (15)*	*63 (10)*	

[1] Unadjusted odds ratio of having sickness absence of ≥4d compared with 0-3d in the full sample

[2] Row percentages

Table A 6.11 Work setting factors and sickness absence.

			Days of Sickness absence (SA)				
Non-work factor	**n (%)**	**n with SA data**	**0d n (%)[2]**	**1-3d n (%)**	**4-7d n (%)**	**≥ 8d n (%)**	**Odds Ratio[1] (95% CI)**
Rank							
Lieutenant and higher	104 (16)	103	69 (67)	12 (12)	14 (14)	8 (8)	1
First Sergeant to First Warrant Officer	265 (41)	261	116 (44)	64 (24)	54 (21)	27 (10)	1.65 (0.96-2.84)
Policeman to Sergeant	285 (44)	278	141 (51)	81 (29)	31 (11)	25 (9)	0.92 (0.53-1.61)
Total	*654 (100)*	*642*	*326 (51)*	*157 (24)*	*99 (15)*	*60 (9)*	
Working hours							
<8 hours	222 (34)	216	95 (44)	65 (30)	31 (14)	25 (12)	1
8-11 hours	399 (60)	393	206 (52)	84 (21)	71 (18)	32 (8)	1.01 (0.69-1.48)
≥ 12 hours	41 (6)	40	27 (68)	7 (18)	2 (5)	4 (10)	0.50 (0.20-1.26)
Total	*662 (100)*	*649*	*328 (51)*	*156 (24)*	*104 (16)*	*61 (9)*	
Shift type							
Day shift	352 (53)	345	162 (47)	86 (25)	56 (16)	41 (12)	1
Night shift	84 (13)	83	40 (48)	25 (30)	10 (12)	8 (10)	0.70 (0.39-1.25)
Other shifts	225 (34)	222	125 (56)	48 (22)	37 (17)	12 (5)	0.72 (0.48-1.07)
Total	*661 (100)*	*650*	*327 (50)*	*159 (24)*	*103 (16)*	*61 (9)*	
Dominant gender at work							
Males	637 (95)	626	325 (52)	154 (25)	91 (15)	56 (9)	1
Females	36 (5)	35	9 (26)	6 (17)	13 (37)	7 (20)	**0.22 (0.11-0.46)**
Total	*673 (100)*	*661*	*334 (51)*	*160 (24)*	*104 (16)*	*63 (10)*	
Transportation time to work							
<15 minutes	134 (19)	121	75 (62)	17 (14)	15 (12)	14 (12)	1
15-29 minutes	196 (28)	181	77 (43)	49 (27)	39 (22)	16 (9)	1.38 (0.82-2.33)
30-59 minutes	182 (26)	162	83 (51)	42 (26)	23 (14)	14 (9)	0.93 (0.53-1.63)
≥60 minutes	182 (26)	170	86 (51)	43 (25)	24 (14)	17 (10)	1.07 (0.58-1.73)
Total	*694 (100)*	*634*	*321 (51)*	*151 (24)*	*101 (16)*	*61 (10)*	

[1] Unadjusted odds ratio of having sickness absence of ≥4d compared with 0-3d in the full sample

[2] Row percentages

Table A 6.12 Non-work health and lifestyle factors and sickness absence.

			Days of Sickness absence (SA)				
Non-work factor	**n (%)**	**n with SA data**	**0d n (%)[2]**	**1-3d n (%)**	**4-7d n (%)**	**≥ 8d n (%)**	**Odds Ratio[1] (95% CI)**
Self-rated health							
Good or better	626 (94)	618	316 (51)	153 (25)	97 (16)	52 (9)	1
Less than good	38 (6)	36	12 (33)	8 (22)	7 (19)	9 (25)	**2.50 (1.27-4.98)**
Total	*664 (100)*	*654*	*328 (50)*	*161 (25)*	*104 (16)*	*61 (9)*	
Work ability							
High (8-10)	498 (71)	455	236 (52)	114 (25)	64 (14)	41 (9)	1
Moderate (5-7)	166 (24)	149	70 (47)	32 (21)	30 (20)	17 (11)	**1.53 (1.02-2.30)**
Low (0-4)	33 (5)	29	17 (59)	6 (21)	4 (14)	2 (7)	0.87 (0.34-2.19)
Total	*697 (100)*	*633*	*323 (51)*	*152 (24)*	*98 (15)*	*60 (9)*	
Presenteeism last 12							
Never	178 (29)	171	102 (60)	32 (19)	21 (12)	16 (9)	1
1-5 times	331 (54)	328	144 (44)	101 (31)	56 (17)	27 (8)	1.22 (0.78-1.90)
6 times or more	100 (16)	99	46 (46)	19 (19)	22 (22)	12 (12)	**1.89 (1.10-3.20)**
Total	*609 (100)*	*598*	*292 (49)*	*152 (25)*	*99 (17)*	*55 (9)*	
Smoking cigarettes							
Never	369 (53)	338	179 (53)	80 (24)	58 (17)	21 (6)	1
Previous smoker	129 (19)	113	54 (48)	25 (22)	18 (16)	16 (14)	1.41 (0.87-2.26)
1-9 cigarettes a day	93 (13)	87	38 (44)	25 (29)	14 (16)	10 (11)	1.28 (0.73-2.12)
10 cigarettes a day or more	105 (15)	93	49 (53)	18 (19)	12 (13)	14 (15)	1.27 (0.75-2.13)
Total	*696 (100)*	*631*	*320 (51)*	*148 (23)*	*102 (16)*	*61 (10)*	
Smoking shisha							
Never	374 (56)	345	170 (49)	94 (27)	54 (16)	27 (8)	1
Previous smoker	174 (26)	158	87 (55)	33 (21)	20 (13)	18 (11)	1.03 (0.66-1.60)
Once a month	51 (8)	43	24 (56)	8 (19)	5 (12)	6 (14)	1.12 (0.54-2.32)
More frequent	71 (11)	64	27 (42)	13 (20)	16 (25)	8 (13)	**1.95 (1.11-3.34)**
Total	*670 (100)*	*610*	*308 (50)*	*148 (24)*	*95 (16)*	*59 (10)*	
Smoking Dokha							
Never	388 (56)	361	182 (50)	89 (25)	64 (18)	26 (7)	1
Previous smoker	105 (15)	90	46 (51)	21 (23)	12 (13)	11 (12)	1.03 (0.60-1.75)
1-6 time a day	71 (10)	62	30 (48)	12 (19)	13 (21)	7 (11)	1.43 (0.80-2.56)
7 times a day or	124 (18)	113	57 (50)	26 (23)	12 (11)	18 (16)	1.10 (0.67-1.76)
Total	*688 (100)*	*626*	*315 (50)*	*148 (24)*	*101 (16)*	*62 (10)*	

[1] Unadjusted odds ratio of having sickness absence of ≥4d compared with 0-3d in the full sample

[2] Row percentages

Table A 6.12 continued

			Days of Sickness absence (SA)				
Non-work factor	**n (%)**	**n with SA data**	**0d n (%)[2]**	**1-3d n (%)**	**4-7d n (%)**	**≥ 8d n (%)**	**Odds Ratio[1] (95% CI)**
BMI category							
Underweight	7 (1)	7	3 (43)	3 (43)	0 (0)	1 (14)	0.50 (0.06-1.75)
Normal	224 (36)	205	113 (55)	41 (20)	29 (14)	22 (11)	1
Overweight	262 (42)	241	125 (52)	63 (26)	36 (15)	17 (7)	0.85 (0.55-1.32)
Obese I	91 (15)	79	37 (47)	17 (22)	19 (24)	6 (8)	1.40 (0.79-2.47)
Obese II	39 (6)	36	17 (47)	10 (28)	5 (14)	4 (11)	1.00 (0.44-2.28)
Total	*623 (100)*	*568*	*295 (52)*	*134 (24)*	*89 (16)*	*50 (9)*	
Frequency of light strenuous exercise							
≥ 3 times a week	204 (29)	186	95 (51)	46 (25)	27 (15)	18 (10)	1
1-2 times a week	224 (32)	204	98 (48)	50 (25)	34 (17)	22 (11)	1.18 (0.75-1.86)
1-3 times a month	137 (20)	121	68 (56)	24 (20)	21 (17)	8 (7)	0.98 (0.57-1.68)
Rare (less than above)	132 (19)	121	63 (52)	30 (25)	15 (12)	13 (11)	0.94 (0.54-1.61)
Total	*697 (100)*	*632*	*324 (51)*	*150 (24)*	*97 (15)*	*61 (10)*	
Frequency of moderately strenuous exercise							
≥ 3 times a week	203 (29)	185	106 (57)	39 (21)	21 (11)	19 (10)	1
1-2 times a week	197 (28)	181	95 (52)	39 (22)	31 (17)	16 (9)	1.27 (0.78-2.06)
1-3 times a month	125 (18)	110	57 (52)	27 (25)	20 (18)	6 (5)	1.12 (0.63-1.96)
Rare (less than above)	173 (25)	157	66 (42)	45 (29)	26 (17)	20 (13)	1.50 (0.91-2.45)
Total	*698 (100)*	*633*	*324 (51)*	*150 (24)*	*98 (15)*	*61 (10)*	
Frequency of heavily strenuous exercise							
≥ 3 times a week	182 (26)	165	90 (55)	38 (23)	17 (10)	20 (12)	1
1-2 times a week	199 (29)	183	99 (54)	42 (23)	30 (16)	12 (7)	1.02 (0.62-1.70)
1-3 times a month	133 (19)	120	61 (51)	27 (23)	20 (17)	12 (10)	1.25 (0.72-2.17)
Rare (less than above)	183 (26)	165	75 (45)	42 (25)	31 (19)	17 (10)	1.41 (0.86-2.33)
Total	*697 (100)*	*633*	*325 (51)*	*149 (24)*	*98 (15)*	*61 (10)*	

[1] Unadjusted odds ratio of having sickness absence of ≥4d compared with 0-3d in the full sample

[2] Row percentages

Table A 6.13 Physical work factors and early retirement intention (ERI).

Work factor	n (%)	n with ERI data	Early retirement intention (ERI) No n (%)[2]	Yes n (%)	Odds Ratio[1] (95% CI)
Vibration					
< half of time	341 (49)	316	222 (70)	93 (30)	1
≥ half of time	350 (51)	307	161 (52)	146 (48)	**2.14 (1.54-2.97)**
Total	*691 (100)*	*623*	*383 (61)*	*240 (39)*	
Noise					
< half of time	423 (62)	388	261 (67)	127 (33)	1
≥ half of time	259 (38)	226	118 (52)	108 (48)	**1.88 (1.34-2.63)**
Total	*682 (100)*	*614*	*379 (62)*	*235 (38)*	
Working in painful positions					
< half of time	372 (53)	330	229 (69)	101 (31)	1
≥ half of time	326 (46)	295	157 (53)	138 (47)	**1.99 (1.43-2.76**)
Total	*698 (100)*	*625*	*386 (62)*	*239 (38)*	
Lifting people					
< half of time	428 (62)	385	259 (67)	126 (33)	1
≥ half of time	264 (38)	235	124 (53)	111 (47)	**1.84 (1.31-2.56)**
Total	*692 (100)*	*620*	*383 (62)*	*237 (38)*	
Carrying heavy objects					
< half of time	477 (69)	431	276 (64)	155 (36)	1
≥ half of time	219 (31)	193	110 (57)	83 (43)	1.34 (0.95-1.89)
Total	*696 (100)*	*624*	*386 (62)*	*238 (38)*	
Working while standing					
< half of time	358 (52)	326	211 (65)	115 (35)	1
≥ half of time	333 (48)	294	172 (59)	122 (42)	1.30 (0.94-1.80)
Total	*691 (100)*	*620*	*383 (62)*	*237 (38)*	
Repetitive hand/arm movements					
< half of time	311 (45)	287	190 (66)	97 (34)	1
≥ half of time	386 (55)	338	198 (59)	140 (41)	1.38 (0.99-1.91)
Total	*697 (100)*	*665*	*388 (62)*	*237 (38)*	
Working on screens					
< half of time	301 (43)	271	185 (68)	86 (32)	1
≥ half of time	401 (57)	358	205 (57)	153 (43)	**1.60 (1.15-2.23)**
Total	*702 (100)*	*629*	*390 (62)*	*239 (38)*	
Dealing with angry clients					
< half of time	367 (52)	331	225 (68)	106 (32)	1
≥ half of time	333 (48)	296	162 (55)	134 (45)	**1.75 (1.26-2.43)**
Total	*700 (100)*	*627*	*387 (61)*	*240 (38)*	

[1]Unadjusted odds ratio of reporting intention for retiring early compared with those without such intention

[2] Row Percentages

Table A 6.14 Employees' perception of health and safety management dimensions and early retirement intentions (ERI)

			Early retirement intention (ERI)		
Work factor	**n (%)**	**n with ERI data**	**No n (%)[2]**	**Yes n (%)**	**Odds Ratio[1] (95% CI)**
Clear vision and objectives of HSE Policy (HSMS1)					
Favourable	537 (52)	477	308 (65)	169 (35)	1
Unfavourable	203 (48)	181	98 (54)	83 (46)	**1.54 (1.09-2.18)**
Total	*740 (100)*	*658*	406 (62)	252 (38)	
HSE policy defines roles and responsibilities of different stakeholders (HSMS2)					
Favourable	525 (71)	470	303 (64)	167 (36)	1
Unfavourable	212 (29)	188	104 (55)	84 (45)	**1.46 (1.03-2.06)**
Total	*737 (100)*	*658*	*407 (62)*	*251 (38)*	
Employees' participation in setting HSE goals and plans (HSMS3)					
Favourable	537 (73)	476	308 (65)	168 (35)	1
Unfavourable	201 (27)	179	96 (54)	83 (46)	**1.58 (1.11-2.24)**
Total	*738 (100)*	*655*	*404 (62)*	*251 (38)*	
Various verbal and non-verbal communication methods used to implement HSE plans (HSMS4)					
Favourable	551 (75)	485	319 (66)	166 (34)	1
Unfavourable	183 (25)	166	83 (50)	83 (50)	**1.92 (1.34-2.74)**
Total	*734 (100)*	*651*	*402 (62)*	*249 (38)*	
HSE training is provided whenever needed (HSMS5)					
Favourable	519 (71)	463	292 (63)	171 (37)	1
Unfavourable	215 (29)	189	110 (58)	79 (42)	1.22 (0.86-1.73)
Total	*734 (100)*	*652*	*402 (62)*	*250 (38)*	

[1]Unadjusted odds ratio of reporting intention for retiring early compared with those without such intention

[2] Row Percentages

Table A 6.14 Continued

			Early retirement intention (ERI)		
Work factor	**n (%)**	**n with ERI data**	**No n (%)[2]**	**Yes n (%)**	**Odds Ratio[1] (95% CI)**
Risk control systems match employees' work profile (HSMS6)					
Favourable	471 (64)	418	272 (65)	146 (35)	1
Unfavourable	264 (36)	235	129 (35)	106 (45)	**1.53 (1.10-2.12)**
Total	*735 (100)*	*653*	*401 (61)*	*252 (39)*	
HSE performance is audited and reviewed regularly (HSMS7)					
Favourable	502 (68)	442	286 (65)	156 (35)	1
Unfavourable	234 (32)	212	117 (55)	95 (45)	**1.48 (1.06-2.07)**
Total	*736 (100)*	*654*	*403 (62)*	*251 (38)*	

[1]Unadjusted odds ratio of reporting intention for retiring early compared with those without such intention

[2] Row Percentages

Table A 6.15 Non-work demographic factors and to early retirement intention.

			Early retirement intention (ERI)		
Non-work factor	**n (%)**	**n with ERI data**	**No n (%)[2]**	**Yes n (%)**	**Odds Ratio[1] (95% CI)**
Age groups					
18-29	279 (46)	271	200 (74)	71 (26)	1
30-39	236 (39)	236	128 (57)	98 (43)	**2.15 (1.47-3.14)**
40-49	80 (13)	80	40 (50)	40 (50)	**2.81 (1.68-4.71)**
≥50	13 (2)	12	8 (67)	4 (33)	1.40 (0.41-4.82)
Total	*608 (100)*	*589*	*376 (64)*	*213 (36)*	
Age per 10 years					**1.70 (1.34-2.14)**
Gender					
Males	604 (91)	588	368 (63)	220 (37)	1
Females	60 (9)	60	36 (60)	24 (40)	1.11 (0.64-1.91)
Total	*664 (100)*	*648*	*404 (62)*	*244 (38)*	
Education					
Postgraduate	29 (4)	29	14 (48)	15 (52)	1
Diploma/Bachelor	152 (21)	150	103 (69)	47 (31)	**0.42 (0.19-0.95)**
High school graduate	334 (50)	324	203 (63)	121 (37)	0.55 (0.25-1.19)
Not a high school graduate	148 (22)	146	83 (57)	63 (43)	0.70 (0.31-1.57)
Total	*663 (100)*	*649*	*403 (62)*	*246 (38)*	
Marital status					
Married	469 (72)	461	271 (59)	190 (41)	1
Not married	184 (28)	180	127 (71)	53 (29)	**0.59 (0.41-0.86)**
Total	*653 (100)*	*641*	*398 (62)*	*243 (38)*	
Years of service					
≤3 years	56 (9)	54	44 (81)	10 (19)	1
4-7 years	199 (30)	195	131 (67)	64 (33)	**2.14 (1.01-4.54)**
8-11 years	166 (25)	157	101 (64)	56 (36)	**2.43 (1.14-5.21)**
≥12 years	232 (36)	227	122 (54)	105 (46)	**3.78 (1.81-7.89)**
Total	*653 (100)*	*633*	*398 (63)*	*235 (37)*	
Partner working					
Yes	202 (36)	200	111 (56)	89 (45)	1
No	363 (64)	350	207 (59)	143 (41)	0.86 (0.60-1.22)
Total	*565 (100)*	*550*	*318 (58)*	*232 (42)*	

[1]Unadjusted odds ratio of reporting intention for retiring early compared with those without such intention

[2] Row Percentages

Table A 6.16 Non-work social life factors and early retirement intention.

			Early retirement intention (ERI)		
Non-work factor	**n (%)**	**n with ERI data**	**No n (%)[2]**	**Yes n (%)**	**Odds Ratio[1] (95% CI)**
Number of children >18 years old					
1-2	203 (31)	198	141 (71)	57 (29)	1.49 (0.98-2.27)
3-5	204 (31)	199	124 (62)	75 (38)	**2.00 (1.32-3.03)**
≥ 6	240 (38)	239	125 (52)	24 (48)	**4.24 (2.04-8.77)**
Total	*651 (100)*	*636*	*390 (61)*	*246 (39)*	
Work life balance					
Satisfied	513 (78)	498	327 (66)	171 (34)	1
Dissatisfied	145 (22)	142	69 (49)	73 (51)	**2.02 (1.38-2.95)**
Total	*658 (100)*	*640*	*396 (62)*	*244 (38)*	
Private social life support					
Satisfied	584 (87)	567	362 (64)	205 (36)	1
Dissatisfied	87 (13)	85	41 (48)	44 (52)	**1.89 (1.19-2.99)**
Total	*671 (100)*	*652*	*403 (62)*	*249 (38)*	
Frequency of meeting friends					
Almost daily	250 (38)	244	167 (68)	77 (32)	1
Once a week	274 (42)	260	165 (63)	95 (37)	1.24 (0.86-1.80)
Less than once a week	134 (20)	134	65 (49)	69 (51)	**2.30 (1.49-3.55)**
Total	*658 (100)*	*638*	*397 (62)*	*241 (38)*	
Number or tragic events last 12 months					
None	262 (40)	255	164 (64)	91 (36)	1
1	194 (29)	189	124 (66)	65 (34)	0.94 (0.63-1.40)
≥ 2	204 (39)	202	111 (55)	91 (45)	**1.47 (1.01-2.15)**
Total	*660 (100)*	*646*	*399 (62)*	*247 (38)*	

[1]Unadjusted odds ratio of reporting intention for retiring early compared with those without such intention

[2] Row Percentages

Table A 6.17 Work settings factors and to early retirement intention.

			Early retirement intention (ERI)		
Non-work factor	**n (%)**	**n with ERI data**	**No n (%)[2]**	**Yes n (%)**	**Odds Ratio[1] (95% CI)**
Rank					
Lieutenant and higher	104 (16)	102	63 (62)	39 (38)	1
First Sergeant to First Warrant Officer	265 (41)	257	144 (56)	113 (44)	1.26 (0.79-2.02)
Policeman to Sergeant	285 (44)	276	189 (68)	87 (32)	0.74 (0.46-1.19)
Total	*654 (100)*	*635*	*396 (62)*	*239 (38)*	
Working hours					
<8 hours	222 (34)	220	155 (70)	65 (30)	1
8-11 hours	399 (60)	381	216 (57)	165 (43)	**1.82 (1.27-2.59)**
≥ 12 hours	41 (6)	40	28 (70)	12 (30)	1.02 (0.48-2.13)
Total	*662 (100)*	*641*	*399 (62)*	*242 (38)*	
Shift type					
Day shift	352 (53)	346	225 (65)	121 (35)	1
Night shift	84 (13)	83	45 (54)	38 (46)	1.57 (0.96-2.55)
Other shifts	225 (34)	219	135 (62)	84 (38)	1.15 (0.81-1.64)
Total	*661 (100)*	*648*	*405 (63)*	*243 (38)*	
Dominant gender at work					
Males	637 (95)	621	381 (61)	240 (39)	1
Females	36 (5)	36	26 (72)	10 (28)	0.61 (0.28-1.25)
Total	*673 (100)*	*657*	*407 (62)*	*250 (38)*	
Transportation time to work					
<15 minutes	134 (19)	118	83 (70)	35 (30)	1
15-29 minutes	196 (28)	180	104 (58)	76 (42)	**1.73 (1.05-2.83)**
30-59 minutes	182 (26)	165	113 (68)	52 (32)	1.09 (0.65-1.82)
≥60 minutes	182 (26)	167	89 (53)	78 (47)	**2.07 (1.26-3.42)**
Total	*694 (100)*	*630*	*389 (62)*	*241 (38)*	

[1]Unadjusted odds ratio of reporting intention for retiring early compared with those without such intention

[2] Row Percentages

Table A 6.18 Non-work health and lifestyle factors and to early retirement intention.

			Early retirement intention (ERI)		
Non-work factor	**n (%)**	**n with ERI data**	**No n (%)[2]**	**Yes n (%)**	**Odds Ratio[1] (95% CI)**
Self-rated health					
Good or better	626 (94)	612	390 (64)	222 (36)	1
Less than good	38 (6)	37	11 (30)	26 (70)	**4.15 (2.01-8.56)**
Total	*664 (100)*	649	401 (62)	248 (38)	
Work ability					
High (8-10)	498 (71)	449	297 (66)	152 (34)	1
Moderate (5-7)	166 (24)	150	76 (51)	74 (49)	**1.90 (1.30-2.76)**
Low (0-4)	33 (5)	26	12 (46)	14 (54)	**2.27 (1.02-5.05)**
Total	*697 (100)*	*625*	*385 (62)*	*240 (38)*	
Presenteeism last 12 months					
Never	178 (29)	170	132 (78)	38 (22)	1
1-5 times	331 (54)	325	190 (58)	135 (42)	**2.46 (1.61-3.76)**
6 times or more	100 (16)	100	46 (46)	54 (54)	**4.07 (2.39-6.95)**
Total	*609 (100)*	*595*	*368 (26)*	*227 (38)*	
Smoking cigarettes					
Never	369 (53)	340	219 (64)	121 (36)	1
Previous smoker	129 (19)	112	67 (60)	45 (40)	1.21 (0.78-1.88)
1-9 cigarettes a day	93 (13)	84	55 (65)	29 (35)	0.95 (0.57-1.57)
10 cigarettes a day or more	105 (15)	89	46 (52)	43 (48)	**1.69 (1.05-2.71)**
Total	*696 (100)*	*625*	*387 (62)*	*238 (38)*	
Smoking shisha					
Never	374 (56)	346	221 (64)	125 (36)	1
Previous smoker	174 (26)	154	98 (64)	56 (36)	1.01 (0.68-1.49)
Once a month	51 (8)	40	19 (48)	21 (52)	**1.95 (1.01-3.77)**
More frequent	71 (11)	62	29 (47)	33 (53)	**2.01 (1.16-3.46)**
Total	*670 (100)*	*602*	*367 (61)*	*235 (39)*	
Smoking Dokha					
Never	388 (56)	360	226 (63)	134 (37)	1
Previous smoker	105 (15)	89	49 (55)	14 (45)	1.37 (0.86-2.20)
1-6 time a day	71 (10)	61	44 (72)	17 (28)	0.65 (0.35-1.18)
7 times a day or more	124 (18)	107	62 (58)	45 (42)	1.22 (0.78-1.89)
Total	*688 (100)*	*617*	*381 (62)*	*236 (38)*	

[1]Unadjusted odds ratio of reporting intention for retiring early compared with those without such intention

[2] Row Percentages

Table A 6.18 continued

Non-work factor	n (%)	n with ERI data	Early retirement intention (ERI) No n (%)[2]	Yes n (%)	Odds Ratio[1] (95% CI)
BMI category					
Underweight	7 (1)	7	6 (86)	1 (14)	0.39 (0.04-3.32)
Normal	224 (36)	201	141 (70)	60 (30)	1
Overweight	262 (42)	237	149 (63)	88 (37)	1.38 (0.92-2.07)
Obese I	91 (15)	80	44 (55)	36 (45)	**1.92 (1.12-3.28)**
Obese II	39 (6)	36	16 (44)	20 (56)	**2.93 (1.42-6.05)**
Total	*623 (100)*	*561*	*356 (63)*	*205 (37)*	
Frequency of light strenuous exercise					
≥ 3 times a week	204 (29)	185	116 (63)	69 (37)	1
1-2 times a week	224 (32)	199	130 (65)	69 (35)	0.89 (0.58-1.35)
1-3 times a month	137 (20)	121	61 (50)	60 (50)	**1.65 (1.03-2.63)**
Rare (less than above)	132 (19)	120	81 (68)	39 (32)	0.80 (0.49-1.31)
Total	*697 (100)*	*625*	*388 (62)*	*237 (38)*	
Frequency of moderately strenuous exercise					
≥ 3 times a week	203 (29)	183	132 (72)	51 (28)	1
1-2 times a week	197 (28)	176	101 (57)	75 (43)	**1.92 (1.23-2.98)**
1-3 times a month	125 (18)	112	61 (54)	51 (46)	**2.16 (1.32-3.54)**
Rare (less than above)	173 (25)	154	94 (61)	60 (39)	**1.65 (1.04-2.61)**
Total	*698(100)*	*625*	*388 (62)*	*237 (38)*	
Frequency of heavily strenuous exercise					
≥ 3 times a week	182 (26)	161	119 (74)	42 (26)	1
1-2 times a week	199 (29)	182	111 (61)	71 (39)	**1.81 (1.14-2.87)**
1-3 times a month	133 (19)	119	64 (54)	55 (46)	**2.43 (1.47-4.02)**
Rare (less than above)	183 (26)	163	95 (58)	68 (42)	**2.02 (1.26-3.24)**
Total	*697 (100)*	*625*	*389 (62)*	*236 (38)*	

[1]Unadjusted odds ratio of reporting intention for retiring early compared with those without such intention

[2] Row Percentages

Table A 6.19 Physical work factors and the odds ratio[1] of sickness absence of three models[2].

Work factor	Unadjusted	Model I	Model II
Vibration (n=461)			
< half of time	*Reference*		
≥ half of time	**0.64 (0.41-0.98)**	**0.61 (0.39-0.94)**	**0.63 (0.41-0.98)**
Noise (n=456)			
< half of time	*Reference*		
≥ half of time	**0.43 (0.26-0.71)**	**0.42 (0.25-0.71)**	**0.44 (0.26-0.73)**
Working in painful positions (n=461)			
< half of time	*Reference*		
≥ half of time	**0.62 (0.40-0.96)**	**0.58 (0.37-0.91)**	**0.61 (0.39-0.95)**
Lifting people (n=456)			
< half of time	*Reference*		
≥ half of time	0.75 (0.48-1.18)	0.72 (0.45-1.15)	0.74 (0.46-1.19)
Carrying heavy objects (n=458)			
< half of time	*Reference*		
≥ half of time	0.63 (0.38-1.03)	0.62 (0.37-1.03)	0.62 (0.37-1.04)
Working while standing (n=457)			
< half of time	*Reference*		
≥ half of time	**0.53 (0.54-0.82)**	**0.55 (0.35-0.86)**	**0.58 (0.37-0.91)**
Repetitive hand/arm movements (n=459)			
< half of time	*Reference*		
≥ half of time	**0.57 (0.37-0.87)**	**0.56 (0.36-0.86)**	**0.57 (0.37-0.88)**
Working on screens (n=464)			
< half of time	*Reference*		
≥ half of time	0.71 (0.46-1.08)	0.69 (0.45-1.06)	0.70 (0.46-1.08)
Dealing with angry clients (n=463)			
< half of time	*Reference*		
≥ half of time	0.91 (0.60-1.04)	0.91 (0.59-1.41)	0.95 (0.61-1.46)

Model I: Adjusted for age and gender **Model II**: Previous model + partner working status.

[1]odds ratio of having sickness absence of ≥4d compared with 0-3d [2] Using the restricted sample of model II with no missing covariate data.

Table A 6.20 Employees' perceptions of health and safety management system dimension and the odds ratio[1] of sickness absence of three models[2].

Work factor	Unadjusted	Model I	Model II
Clear vision and objectives of HSE policy (n=458) (HSMS1)			
Favourable	*Reference*		
Unfavourable	1.01 (0.64-1.58)	1.01 (0.62-1.56)	1.02 (0.64-1.62)
HSE policy defines roles and responsibilities of different stakeholders (n=485)(HSMS2)			
Favourable	*Reference*		
Unfavourable	0.84 (0.53-1.34)	0.86 (0.54-1.38)	0.88 (0.55-1.41)
Employees' participation in setting HSE goals and plans (n=483) (HSMS3)			
Favourable	*Reference*		
Unfavourable	0.87 (0.54-1.41)	0.82 (0.50-1.33)	0.85 (0.52-1.39)
Various verbal and non-verbal communication methods used to implement HSE plans (n=480) (HSMS4)			
Favourable	*Reference*		
Unfavourable	0.70 (0.42-1.17)	0.68 (0.40-1.13)	0.69 (0.41-1.17)
HSE training is provided whenever needed (n=480) (HSMS5)			
Favourable	*Reference*		
Unfavourable	0.76 (0.47-1.22)	0.77 (0.47-1.24)	0.80 (0.49-1.30)
Risk control systems match employees' work profile (n=481) (HSMS6)			
Favourable	*Reference*		
Unfavourable	1.08 (0.71-1.66)	1.09 (0.70-1.60)	1.11 (0.71-1.72)
HSE performance is audited and reviewed regularly (n=482) (HSMS7)			
Favourable	*Reference*		
Unfavourable	1.01 (0.64-1.57)	1.02 (0.65-1.61)	1.04 (0.66-1.65)

Model I: Adjusted for age and gender **Model II**: Previous model + partner working status

[1]odds ratio of having sickness absence of ≥4d compared with 0-3d [2] Using the restricted sample of model II with no missing covariate data.

Table A 6.21 Comparison between the association between work factors and the odds[1] of sickness absence in the unadjusted model and model I using the full sample and the restricted sample of the fully adjusted model.

	Unadjusted		Model I	
Work factor	***Full sample***	***Excluding individuals with missing covariate data***	***Full sample***	***Excluding individuals with missing covariate data***
Job control n	618	335	555	335
High	*Reference*			
Medium	1.04 (0.65-1.66)	1.05 (0.56-1.96)	1.17 (0.71-1.92)	1.13 (0.60-2.14)
Low	1.14 (0.72-1.80)	1.23 (0.67-2.24)	1.08 (0.66-1.76)	1.22 (0.66-2.25)
Job demand n	650	348	571	348
Low	*Reference*			
Medium	1.43 (0.92-2.20)	1.17 (0.63-2.16)	1.24 (0.77-2.01)	1.22 (0.66-2.28)
High	0.93 (0.58-1.49)	0.90 (0.47-1.69)	0.92 (0.55-1.54)	0.99 (0.52-1.88)
Psychological work classification n	602	330	541	330
Relaxed	*Reference*			
Passive	1.10 (0.68-1.86)	1.40 (0.73-2.67)	1.20 (0.71-2.03)	1.48 (0.77-2.87)
Active	0.75 (0.39-1.42)	0.90 (0.40-2.05)	0.87 (0.44-1.71)	1.01 (0.43-2.33)
Strain	0.86 (0.47-1.60)	1.02 (0.47-2.19)	0.93 (0.48-1.79)	1.13 (0.51-2.47)

[1]odds ratio of having sickness absence of ≥4d compared with 0-3d

Model I: Adjusted for age and gender

Table A 6.21 continued

	Unadjusted		Model I	
Work factor	***Full sample***	***Excluding individuals with missing covariate data***	***Full sample***	***Excluding individuals with missing covariate data***
Co-workers support n	651	348	573	348
High	*Reference*			
Medium	0.98 (0.65-1.48)	0.89 (0.52-1.53)	0.99 (0.64-1.55)	0.89 (0.51-1.55)
Low	1.23 (0.70-2.01)	1.15 (0.59-2.23)	1.16 (0.67-1.99)	1.12 (0.57-2.20)
Supervisors support	659	348	579	348
High	*Reference*			
Medium	1.04 (0.65-1.54)	1.12 (0.66-1.90)	0.96 (0.63-1.47)	1.15 (0.67-1.97)
Low	0.93 (0.58-1.51)	0.86 (0.45-1.66)	0.78 (0.45-1.34)	0.82 (0.42-1.61)
Workplace support	643	344	567	344
High	*Reference*			
Medium	1.23 (0.81-1.84)	1.13 (0.66-1.92)	1.17 (0.75-1.80)	1.17 (0.68-2.01)
Low	1.07 (0.65-1.77)	1.10 (0.51-1.98)	1.01 (0.58-1.77)	0.96 (0.47-1.91)
Overall perception of HSE management system n (HSMST)	650	349	573	349
Favourable	*Reference*			
Unfavourable	0.78 (0.50-1.21)	0.88 (0.49-1.57)	0.73 (0.44-1.20)	0.87 (0.48-1.57)
Combined physical exposure	582	344	511	344
low	*Reference*			
Medium	**0.50 (0.31-0.81)**	**0.45 (0.24-0.82)**	**0.47 (0.28-0.79)**	**0.46 (0.25-0.85)**
High	0.70 (0.45-1.09)	**0.38 (0.21-0.70)**	**0.56 (0.34-0.93)**	**0.37 (0.20-0.68)**

Model I: Adjusted for age and gender.

Table A 6.22 Physical work factors and the odds ratio[1] of early retirement intention in three models[2].

Work factor	Unadjusted	Model I	Model II
Vibration (n=517)			
< half of time	*Reference*		
≥ half of time	**1.66 (1.15-2.39)**	**1.64 (1.13-2.38)**	**1.62 (1.11-2.37)**
Noise (n=511)			
< half of time	*Reference*		
≥ half of time	1.38 (0.94-2.02)	**1.52 (1.02-2.25)**	**1.56 (1.04-2.34)**
Working in painful positions (n=518)			
< half of time	*Reference*		
≥ half of time	**1.58 (1.09-2.27)**	**1.76 (1.21-2.57)**	**1.75 (1.18-2.57)**
Lifting people (n=514)			
< half of time	*Reference*		
≥ half of time	1.34 (0.92-1.95)	**1.55 (1.05-2.29)**	**1.52 (1.02-2.28)**
Carrying heavy objects (n=517)			
< half of time	*Reference*		
≥ half of time	0.88 (0.58-1.33)	1.05 (0.68-1.60)	1.08 (0.69-1.69)
Working while standing (n=515)			
< half of time	*Reference*		
≥ half of time	1.06 (0.74-1.53)	1.14 (0.79-1.66)	1.13 (0.77-1.66)
Repetitive hand/arm movements (n=516)			
< half of time	*Reference*		
≥ half of time	1.15 (0.80-1.66)	1.12 (0.77-1.63)	1.12 (0.77-1.64)
Working on screens (n=522)			
< half of time	*Reference*		
≥ half of time	1.28 (0.89-1.84)	1.36 (0.93-1.97)	1.39 (0.94-2.04)
Dealing with angry clients (n=519)			
< half of time	*Reference*		
≥ half of time	**1.49 (1.04-2.14)**	**1.64 (1.12-2.38)**	**1.71 (1.16-2.50)**

Model I: Adjusted for age and gender **Model II**: Previous model + education, marital status and years of service

[1]odds ratio of reporting intention for retiring early compared with those without such intention [2] Using the restricted sample of model II with no missing covariate data.

Table A 6.23 Employees' perceptions of each health and safety management system dimension and the odds ratio[1] of early retirement intention in three models[2].

Work factor	Unadjusted	Model I	Model II
Clear vision and objectives of HSE policy (n=546) (HSMS1)			
Favourable	*Reference*		
Unfavourable	**1.52 (1.04-2.24)**	1.39 (0.94-2.07)	1.34 (0.89-1.99)
HSE policy defines roles and responsibilities of different stakeholders (n=546) (HSMS2)			
Favourable	*Reference*		
Unfavourable	1.45 (0.99-2.13)	1.37 (0.92-2.02)	1.31 (0.88-1.95)
Employees' participation in setting HSE goals and plans (n=545) (HSMS3)			
Favourable	*Reference*		
Unfavourable	1.46 (0.99-2.15)	1.34 (0.90-2.00)	1.28 (0.85-1.91)
Various verbal and non-verbal communication methods used to implement HSE plans (n=541) (HSMS4)			
Favourable	*Reference*		
Unfavourable	**1.80 (1.20-2.68)**	**1.76 (1.17-2.64)**	**1.75 (1.16-2.65)**
HSE training is provided whenever needed (n=541) (HSMS5)			
Favourable	*Reference*		
Unfavourable	1.20 (0.82-1.77)	1.18 (0.79-1.74)	1.19 (0.80-1.78)
Risk control systems match employees' work profile (n=541) (HSMS6)			
Favourable	*Reference*		
Unfavourable	**1.56 (1.08-2.25)**	1.42 (0.97-2.06)	1.42 (0.97-2.08)
HSE performance is audited and reviewed regularly (n=543) (HSMS7)			
Favourable	*Reference*		
Unfavourable	**1.56 (1.07-2.27)**	1.46 (0.99-2.14)	1.46 (0.99-2.15)

Model I: Adjusted for age and gender **Model II**: Previous model + education, marital status and years of service.

[1]odds ratio of reporting intention for retiring early compared with those without such intention [2] Using the restricted sample of model II with no missing covariate data.

Table A 6.24 Comparison between the association between work factors and the odds[1] of early retirement intention in the unadjusted model and model I using the full sample and the restricted sample of the fully adjusted model.

	Unadjusted		Model I	
	Full sample	***Excluding individuals with missing covariate data***	***Full sample***	***Excluding individuals with missing covariate data***
Job control n	613	319	548	319
High	*Reference*			
Medium	1.25 (0.81-1.93)	1.03 (0.56-1.89)	1.34 (0.84-2.13)	1.00 (0.54-1.85)
Low	**1.74 (1.14-2.64)**	1.54 (0.88-2.72)	**1.60 (1.01-2.52)**	1.45 (0.82-2.59)
Job demand n	643	328	564	328
Low	*Reference*			
Medium	0.95 (0.64-1.40)	1.31 (0.71-2.31)	1.07 (0.68-1.67)	1.35 (0.73-2.52)
High	0.75 (0.50-1.13)	1.06 (0.58-1.95)	0.99 (0.63-1.57)	1.09 (0.58-2.06)
Psychological work classification n	598	315	535	315
Relaxed	*Reference*			
Passive	**1.59 (1.01-2.51)**	1.29 (0.69-2.41)	1.44 (0.87-2.36)	1.31 (0.69-2.49)
Active	0.80 (0.44-1.46)	0.74 (0.34-1.62)	0.78 (0.41-1.47)	0.77 (0.34-1.71)
Strain	1.42 (0.82-2.46)	1.43 (0.70-2.91)	1.62 (0.90-2.91)	1.44 (0.69-3.01)

[1]odds ratio of reporting intention for retiring early compared with those without such intention

Model I: Adjusted for age and gender.

Table A 6.24 continued

	Unadjusted		Model I	
	Full sample	***Excluding individuals with missing covariate data***	***Full sample***	***Excluding individuals with missing covariate data***
Co-workers support n	642	315	565	315
High	*Reference*			
Medium	**1.55 (1.06-2.27)**	1.65 (0.96-2.86)	1.33 (0.88-2.01)	1.44 (0.82-2.53)
Low	**2.95 (1.58-4.63)**	**2.76 (1.38-5.17)**	**2.26 (1.37-3.72)**	**2.32 (1.18-4.56)**
Supervisors support n	650	315	571	315
High	*Reference*			
Medium	1.42 (0.98-2.06)	1.69 (0.99-2.90)	1.31 (0.87-1.96)	1.57 (0.90-2.72)
Low	**2.61 (1.70-4.01)**	**2.14 (1.14 -4.01)**	**2.19 (1.36-3.52)**	**2.10 (1.11-3.97)**
Workplace support n	634	315	559	315
High	*Reference*			
Medium	**1.85 (1.27-2.71)**	**2.20 (1.28-3.80)**	**1.71 (1.14-2.57)**	**1.94 (1.11-3.39)**
Low	**3.01 (1.92-4.72)**	**3.52 (1.30-4.88)**	**2.35 (1.42-3.87)**	**2.35 (1.20-4.60)**
Overall perception of health and safety management n (HSMST)	642	313	565	313
Favourable	*Reference*			
Unfavourable	**2.03 (1.40-2.96)**	**2.05 (1.20-3.49)**	**1.65 (1.08-2.51)**	**1.84 (1.07-3.19)**
Combined physical exposure	575	315	505	315
low	*Reference*			
Medium	1.38 (0.90-2.13)	1.62 (0.91-2.85)	1.42 (0.89-2.26)	1.58 (0.88-2.85)
High	**2.29 (1.52-3.44)**	1.48 (0.84-2.60)	**1.98 (1.25-3.13)**	1.68 (0.94-3.00)

Model I: Adjusted for age and gender.

Table A 6.25 Reasons for holding early retirement intention

Reason for holding early retirement intention (n=253)	Observations	Percentage
Ill health of a relative/ friend	10	4
I can manage financially from pension and other sources.	32	13
To enjoy life and spend more time with partner/family	69	29
Fed up with job and want a change (possibly another job)	58	24
To give the younger generation a chance	22	9
None of these	37	16
Total	**239**	**100**